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Set	Items	Description
S1	886	PHASE(2N)CONJUGAT?
S2	956872	PROBE? OR PROBING OR INTERROGAT? OR EXPLOR? OR INVESTIGAT? OR INSPECT? OR PENETRAT? OR PROD?
S3	207722	BEAM? OR LASER? OR LIGHT(2N)(PULS? OR MODULAT?) OR MASER? - OR QUANTUM(2N)ELECTRONIC? OR OPTICAL(2N)(PUMP? OR GENERAT? OR MODULAT? OR OSCILLATOR?) OR IRASER? OR QUANTUM()GENERATOR?
S4	1742	INTRACAVIT? OR INTRA()CAVIT?
S5	112	S1(S)S2(S)S3
S6	2	S5 AND IC=H04B-010/00
S7	2	S5(S)S4
S8	1	S7 NOT S6
S9	22229	S2(3N)S3
S10	73	S9(S)S1
S11	34	S10/TI,AB,CM
S12	32	S11 NOT (S8 OR S6)

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6/5,K/1 (Item 1 from file: 348)
DIALOG(R)File 348:EUROPEAN PATENTS
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00279250

SYSTEM AND METHOD FOR ENCODING INFORMATION ONTO AN OPTICAL BEAM.
VORRICHTUNG UND VERFAHREN ZUR INFORMATIONSKODIERUNG EINES OPTISCHEN
STRAHLES.
SYSTEME ET PROCEDE SERVANT A CODER DES INFORMATIONS SUR UN FAISCEAU
OPTIQUE.

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CITED PATENTS (WO A): GB 2135050 A

CITED REFERENCES (EP A):

See also references of WO8705715;

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IDEM

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NOTE:

No A-document published by EPO

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FULLTEXT AVAILABILITY:

Available Text	Language	Update	Word Count
CLAIMS B	(English)	EPBBF1	1915
CLAIMS B	(German)	EPBBF1	2006
CLAIMS B	(French)	EPBBF1	2217
SPEC B	(English)	EPBBF1	4591
Total word count - document A			0
Total word count - document B			10729
Total word count - documents A + B			10729

...INTERNATIONAL PATENT CLASS: H04B-010/00

...SPECIFICATION essentially passive in the sense that it has a known response to an input optical **beam** , and in effect **produces** an output **beam** that is slaved to the input **beam** .

Since PCMs and photorefractive devices in general are of interest in this invention, it will...

...grating period; in general, however, this shift can be any fraction of the grating period.

Phase conjugation is an optical phenomenon that has attracted considerable attention in recent years. Several different ways of **producing phase conjugated beams** have been discussed in the literature, including four-wave mixing, stimulated Brillouin scattering, Raman scattering, three-wave mixing and photon echo devices. A review of various applications of optical **phase conjugation** is presented by Giuliano in Physics Today, "Applications of Optical **Phase Conjugation** ", April 1981, pages 27-35. A general review of the field is given in A. Yariv, IEEE, J. **Quantum Electronics** QE14, 650 (1978), and in "The **Laser Handbook Vol. 4**", edited by M. L. Stitch and M. Boss, Chapter 4 by the present inventor, "Non-Linear Optical **Phase Conjugation** ", pages 333-485, North Holland Publishing Co. 1985.

Basically, a **phase conjugate** mirror (PCM) **produces** a retro-reflective reflection of an incident **beam** , with the phase of the reflected **beam** reversed from that of the incident **beam** at the point of reflection. A typical PCM known in the prior art is shown...

...This is illustrated as a four-wave mixer, in which a pair of contra-directional **laser beams** 2 and 4 are directed into an optical mixing medium 6. An initializing **laser beam** E(sub(I)), equal in frequency to **beams** 2 and 4, is directed into the mixing medium from the side. As a result of the action of the various **beams** within the mixing medium, a reflected **beam** RE(sub(I))* , where R is the coefficient of reflectivity, is reflected back in a direction opposite to incident **beam** E(sub(I)). Since power is pumped into the system by **beams** 2 and 4,

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the reflector may **produce** an amplification which makes R greater than 1.

In addition to being retro-reflective to...to a laser beam. In the case of a PCM, an encoded phase-conjugated output **beam** 20A will be **produced**

The effect of the modulating signal upon the laser beam will depend upon the frequency...

...beams cross-coupled with each other, transferring energy from return beam 30 and forming a **phase conjugate** of the **probe beam**, the **phase conjugated beam** 32 emerging from the crystal along a path which is substantially retro-reflective to the original **probe beam** 20.

A carrier signal provided by alternating voltage source 8 is connected in series with...

...interferometers, ring laser gyroscopes, remote beacons, friend-or-foe identification, fiber communication links, mode-locked **phase conjugate** lasers/resonators, two-wave and four-wave mixer/modulator schemes, and many optical mathematical functions information on a desired characteristic, such as temperature. It **produces** a modulating signal that varies with the parameter being measured, and is applied to modulate ...

...as that shown in the previous figures and identified by the same reference numerals. A **laser** 42 **produces** a **beam** that is focused by lens 44 onto one end of an optical fiber 46, the remote end of which emits a **beam** that is collimated by lens 48 onto the photorefractive crystal 18. A **phase conjugate** of the input **beam** to the crystal is directed back through the lens and optical fiber system, the return...

...with the modulating signal from sensor 38. This signal can then be extracted from the **beam** at a remote location from sensor 38 by means of a one-way mirror 49 in the **beam** path and a detection unit 50.

The retro-reflective characteristic of the PCM assures that...

...which splits the beam and directs it to the two PCMs. The phase conjugate return **beams** from the two PCMs are then directed by element 62 to an output stage 64, which delivers the combined **beams** to an interferometric (heterodyne) detector 66. Detector 66 **produces** an output which indicates any frequency differences between the two returned **beams**. Thus, PCM 52 serves as a reference for the **beam** returned from modulated PCM 51, enabling the low frequency modulating signal to be extracted by...

...CLAIMS substantially higher frequency range than the frequency of field alternation, thereby encoding information onto the **phase conjugated** output **beam** (20A; 32) substantially through modulation of the photorefractive material's electro-optic effect.
17. The...

...modulating signal within the frequency regime of the field alternation, thereby encoding information onto the **phase conjugated** output **beam** (20A; 32) by modulating both the photorefractive material's ...of the first beam (22) within the crystal (18) at which a phase conjugated output **beam** (20A, 32) is **produced** thereby establishing a photorefractive grating, and

means (14, 16, 8; 21; 40; 54; 68) for...

...19; 38; 56) for modulating the alternating electric field to encode information onto the output **beam** (32; 20A) by means of the electro-optic effect in said crystal (18).

23. The...angle (A) to the first beam (20) to produce an output beam (32) as a **phase conjugate** of the first **beam** (20), thereby providing

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- self-pumped conjugate reflection of the first **beam** (20).
34. The method of claim 32, wherein the electric field alternation is substantially higher...

6/5,K/2 (Item 1 from file: 349)
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00844604 **Image available**

REMOTELY-INTERROGATED HIGH DATA RATE FREE SPACE LASER COMMUNICATIONS LINK
LIAISON DE TELECOMMUNICATION PAR LASER EN ESPACE LIBRE AVEC INTERROGATION A
DISTANCE A UN DEBIT BINAIRE ELEVEE,

Patent Applicant/Assignee:

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Detailed Description

Claims

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English Abstract

A system and method of remotely extracting information from a communications station by **interrogation** with a low power **beam** .
Nonlinear **phase conjugation** of the low power **beam** results in a high power encoded return **beam** that automatically tracks the input **beam** and is corrected for atmospheric distortion. Intracavity nondegenerate four wave mixing is used in a broad area semiconductor **laser** in the communications station to **produce** the return **beam** .

French Abstract

Cette invention a trait a un systeme et a la technique correspondante permettant d'extraire, a distance, une information d'une station de communications par une interrogation effectuee grace a un faisceau de faible puissance. La conjonction de phase non lineaire du faisceau de faible puissance se traduit par l'existence d'un faisceau de retour code a haute puissance qui poursuit automatiquement le faisceau en entree et dont la distorsion atmospherique est corrigees. On utilise le melange non degenere a quatre ondes intracavitaire dans un laser a grande surface a semi-conducteur dans la station de communications afin de produire le faisceau de retour.

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Detailed Description

Claims

English Abstract

A system and method of remotely extracting information from a communications station by **interrogation** with a low power **beam** . Nonlinear **phase conjugation** of the low power **beam** results in a high power encoded return **beam** that automatically tracks the input **beam** and is corrected for atmospheric distortion. Intracavity nondegenerate four wave mixing is used in a broad area semiconductor **laser** in the communications station to **produce** the return **beam** .

Detailed Description

... as provide an automatic pointing and tracking function.

In order to produce a remotely interrogated **phase conjugate** communication link, the following sequence of events may occur as shown in Figure 2. First, the **probe** beacon 232 from a source 200 illuminates the general area of a sensor 202 having a RM-PCM 202a with a broad **beam** . The RM-PCM 202a is an optical, passive device. Second, the RM-PCM 202a generates a retroreflected **beam** 236 by self-pumped **phase conjugation** , establishing a communication link (comlink) between the source 200 and the sensor 202. Third, the data 240 to be transferred from the sensor 202 is encoded on the return **beam** 236 by modulating the **phase**

conjugate reflectivity of the RM-PCM 202a. The wavefront of the incident

beam 232 is reversed or phase organized to **produce** the retroreflected **beam** 236. Fourth, the retroreflected **beam** 236 propagates back to the source 200 substantially retracing its path, correcting wavefront distortions, and providing automatic pointing and tracking. The retroreflected **beam** 236 reaches the source 200 where a **beam** splitter 238 intercepts the retroreflected **beam** 236, the output of the **beam** splitter 238 is decoded it in a decoder 242 and the data 244 is retrieved ...

...a high signal to noise communications link to be established. Most low power nonlinear optical **phase conjugation** systems proposed for communication links are based on photorefractive effects in crystals. These methods often require mutual coherence between the signal (**probe**) **beam** and the pump **beams** and generally employ self-pumped non-collinear degenerate four-wave mixing configurations.

The angular rate...

...of the system angular resolution $(\Delta\theta) = \lambda/d$ to the response time of the nonlinear **phase conjugate** element. Although low power **phase conjugation** with self-pumped photorefractive crystals can be useful in many applications, it suffers from the major limitation that the power transmitted in the retroreflected **beam** will always be a very small fraction of the **probe beam** , a large amount of **probe beam** power will be needed to initiate the link, and since the response time of photorefractive...

...be limited to extremely low data and tracking rates (sub-kiloHertz (kHz)). For configurations that **phase**

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conjugate the retroreflected **beam** at the **probe** transmitter,, more moderate **laser** powers can be used, but multiple round trips between the **probe** beacon location and the sensor must take place to establish a solid link.

While operating...

...laser operation

a requirement for long range operation. Alternate photorefractive geometries based on mutually pumped **phase conjugation** can mitigate coherence requirements but can be substantially more complex and still suffer from inherent...

...station capable of receiving said interrogating beam; the communication station having a plurality of micro- **phase conjugators** arranged in an array.

Further aspects of the invention include a system and method comprising...

...from a transceiver;

receiving said interrogating beam at a communication station; encoding data onto a **phase conjugate beam** data and pumping the encoded **phase**

conjugate reflectivity by nondegenerate four wave mixing; and transmitting the encoded **phase conjugate beam** back to the transceiver

BRIEF DESCRIPTION OF THE DRAWINGS

The accompanying drawings, which are incorporated...

...of an

ordinary mirror;

Figure 1B discloses a schematic diagram of the operation of a **phase conjugate** mirror;

Figure 2 discloses a block diagram showing the establishment of a communications link using a retro-modulator **phase conjugate** mirror (RM-PCM);

Figure 3A illustrates an elevational view of a mobile platform transmitting an **interrogating** beacon to a ground based sensor having a broad area diode **laser micro-phase conjugator** (or actively modulated retro-reflector);

Figure 3B is a perspective view of the sensor of...an RM PCM based on non-degenerate four wave mixing (NDFWM) in broad area semiconductor **laser** diodes used in the system and method described herein;

Figure 5A is a perspective view of a first approach to obtain two dimensional **phase conjugation** in diode systems using a broad area diode

laser micro-phase conjugator having a plurality of stacked commercial

single stripe diodes;

Figure 5B is an elevational view of a second approach to obtain two dimensional **phase conjugation** in diode systems using a broad area diode **laser micro-phase conjugator** having a vertical cavity surface emitting **laser** (VCSEL);

Figures 5C and 5D are perspective views of a third approach to obtain two dimensional **phase conjugation** in diode systems using a broad

area diode **laser micro-phase conjugator** having a modification of a broadarea, distributed feedback (a-DFB) **laser** to allow the **interrogating** beacon

to access the gain stripe through an aperture in the top of the device;

Figure 5E is a perspective view of intracavity **laser** operation of the modified broad-area, distributed feedback **laser** of Figures 5C and

513;

Figure 5F is an elevational view of fourth approach to obtain two dimensional **phase conjugation** in diode systems using a broad area diode **laser micro-phase conjugator** having the modified broad-area, distributed feedback lasers in a substantially linear array arrangement; Figure...

...of a system and method of optical interconnection using a plurality of broad area diode **laser micro-phase conjugators** ; and
Figure 6B is block diagram of the system and method of optical interconnection of...

...second (sec)), remotely interrogated laser communications system (RILCS) based on nonlinear optical semiconductor laser micro- **phase conjugators** (also known herein as active retro-modulated micro- **phase - conjugators** (ARMPCs)). Broad area diode **laser micro-phase conjugators** function as actively-modulated retroreflectors which amplify and encode an **interrogating laser beam** and return it precisely to the **beam** source. The term "broad area" will be used herein to indicate that the micro- **phase conjugators** are large aperture **phase conjugators** in a semiconductor device. An aperture may be defined as the acceptance opening or input of a **phase conjugate** system.

Therefore, the aperture which receives an incoming laser beam may be greater than the...

...an interrogating beacon 302 to a ground based sensor 304 having a semiconductor laser micro- **phase conjugator** . Data from the sensor 304 is then encoded onto the **interrogating beam** and a retroreflected or return **beam** 306 is sent back to the aerial platform 300.

Figure 3B is a perspective view...

...interrogating beacon 302 at the RM-PCM 310 having a broad area diode laser micro- **phase conjugator** . Sensor 304 further includes a radio frequency/global positioning service (RF/GPS) antenna to determine...

...transceiver 320 mounted on the aerial platform 300 and the sensor 304. In operation, diode **laser** 321 transmits a continuous wave 322 to a **probe** beacon telescope 324. The diode **laser** 321 may be a frequency stabilized single frequency 1550 nm diode **laser** used in conjunction with an erbium doped fiber amplifier (EDFA). Frequency stabilization of the diode **laser** 321 may be achieved using opto-electronic **laser** stabilization electronics. **Probe** beacon telescope 324 transmits an **interrogating beam** 302 in the general direction of the sensor 304. The sensor 304 receives the **interrogating beam** 302 through an input telescope 336 which is coupled to the RM-PCM having a broad area diode **laser micro-phase conjugator** 334. The broad area diode **laser micro-phase conjugator** 334 will receive the **interrogating beam** 334 and will return a **phase conjugate beam** encoded with data collected by the sensor head

314

to the transceiver. The **interrogating beam 302** operating at frequency ω , contains phase information regarding the atmospheric distortions and will essentially trigger the diode **laser oscillator** of the broad area diode **laser micro-phase conjugator 334** to pump the encoded **phase conjugate beam**

via intracavity nondegenerate four wave mixing (NDFWM) (which is discussed in detail below). Encoding of the **phase conjugate beam** at approximately 1 kHz to approximately 10 GHz (...approximately 10 GHz) rates is accomplished by modulating the current to the broad area diode **laser micro-phase conjugator 334**. Sensor head 314 collects the data which is to be transmitted in cooperation with...

...and over again) or may be triggered by a sensor (not shown) which detects the **interrogating beam 302**. Encoded data 330 is sent from the encoder 328 to the drive current controller 338. The drive current controller 338 modulates the encoded data onto the **interrogating beam 302** in the broad area diode **laser micro-phase conjugator 334** by controlling the current to the broad area diode **laser micro-phase conjugator 334**. An encoded **phase conjugate beam 306** is transmitted back on the same path as the - **interrogating beam 302** to the transceiver 320. The **probe** beacon telescope 324 at the transceiver 320 collects the encoded **phase conjugate beam 306**, separates it from the outgoing **interrogating beam** with a fiber optic circulator (not shown) and transmits the signal to an optical receiver...

...kilometers to approximately 25 kilometers in remote interrogation of the broad area diode **laser micro-phase conjugator 334** from an aerial mobile platform; and approximately 100 to approximately 5000 kilometers in satellite...

...interact with two intracavity, counterpropagating pump waves 402,404 at frequency ω , will generate a **phase conjugate beam 306** at a frequency, ω , equal to 2ω (i.e., $\omega = 2\omega - \omega$). **Phase conjugation** by four wave mixing in **laser diodes** uses the intracavity **laser beams 402,404** as pump **beams** for the four wave mixing process. The nonlinear susceptibility involved in the four wave mixing...

...waves. Broad-area, angle-distributed feedback lasers are device structures that are well-suited for **phase conjugation** via intracavity four-wave mixing. Lateral grating confinement in a broad area multimode waveguide results...

...stable single longitudinal and transverse modes. Even when the wavefront is incompletely sampled by the **phase conjugator 334**, compensation of low frequency spatial components may be sufficient for automatic pointing and tracking...

...gm) aperture. As discussed above, an aperture is the acceptance opening or input of a **phase conjugate** system. With these intense intracavity pump **beams**, all that is needed is an external **interrogating signal beam** to be injected into the cavity of the **laser diode** to **produce** efficient four wave mixing. The system and method described herein may achieve approximately 20 dB or greater

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gains in **phase conjugate** signals with less than approximately 10 nanoWatts (nW) of injected **probe** power.

In the disclosed system and method, two dimensional phase conjugation may be used. (Typically...

...the short direction). For high fidelity phase conjugation, the aperture of the broad area semiconductor **laser** diode 334 should resolve substantially all (or a 'substantial portion' of) the spatial components of the input wavefront of the **interrogating beam**.

('Substantial portion' may be defined as greater than 60% and ideally greater than 80%). In ...stripes indicated by 501a, 502a, 503a, and 504a) in the broad area diode laser micro- **phase conjugator** 334. The broad area diode **laser** micro- **phase**

conjugator 334 utilizes aperture synthesis with a plurality of lasers to form a two dimensional array to sample the wavefront of the **interrogating beam** 302. The array may be formed a stacked single stripe devices or spaced apart to...

...In this implementation, optical pump 520 is used to insure uniform gain across a large **laser** aperture, the external VCSEL resonator may control the spatial mode of the intracavity pump **beams** 522, while an external seed **laser** 523 (or lineriarrowing element) insures single longitudinal mode operation. The second resonator may be used to amplify the **interrogating beam** 302 and the **phase conjugate beam** 306. In a VCSEL, the **interrogating beam** 302 and the **optical pump beam** are substantially parallel (and maybe collinear). The potential for high fidelity wavefront correction. using a...three devices.

Efficient optical coupling of the probe beacon into the optical semiconductor laser micro- **phase conjugators** (or ARMPs) is desired to producing **phase conjugate** transceivers with low prime power requirements. It primarily determines the amount of **laser** power required from the transceiver (or beacon) to initiate the communications link. Once the communications link is established, the **phase conjugation** process will guarantee that the coupling is optimal and alignment insensitive. The intrinsic greater than...

...in the range of approximately 30 to approximately 40 dB gain) in the ARMPs will produce a retroreflector **beam** with sufficient power to close the communications link over long ranges. Absolute power of the retro- **beam** is determined by the four-wave mixing conversion efficiency and the rated output power of the broad area **laser** diode used n the device.

Optimally designed coupling optics should yield approximately 75 to 80...
...divergence and narrow optical linewidths of both the interrogating laser beacon and its precisely pointed **phase conjugate** return, coupled with burst mode operation, may make the system substantially undetectable. When operating at...of pointing and tracking systems on the interrogated end of the laser communications link. The **phase conjugating** optical semiconductor **laser** micro- **phase conjugator** described herein are constructed to adaptively point and track the **interrogating laser**

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beacon.

The micro-phase conjugators may automatically seek out the intended receiver aperture within the...

Claim

... station capable of receiving said interrogating beam; and
said communication station having a plurality of **phase conjugators** arranged in an array.

2 The system of claim 1 further comprising:
said communication station...

...said communication station is
configured to respond to said interrogating beam by encoding data into
phase conjugate beam in the plurality of semiconductor **laser**
diodes and
pumping the encoded **phase conjugate beam** by intracavity
nondegenerate four wave mixing.

4 The system of claim 3, wherein said encoding...

...least four.

10 The system of claim 1, wherein the apertures of the plurality
of **phase conjugators** are sufficient to resolve a substantial portion
of the
spatial components of the input wavefront of the **interrogating beam** .

11 The system of claim 1, wherein the apertures of the plurality
of **phase conjugators** are sufficient to resolve greater than
approximately 80% of the spatial components of the input wavefront of the
interrogating beam .

12 The system of claim 1, wherein the communication station
does not have a movable...

...claim 1, wherein the interrogating beam
interacts with pump beams operating in the plurality of **phase conjugators** ,
at a substantially transverse angle.

15 The system of claim 1, wherein the interrogating beam
interacts with pump beams operating in the plurality of **phase conjugators**
in a substantially parallel manner.

16 The system of claim 1, wherein the transceiver is...

...a communication station capable of receiving said interrogating
beam; and
said communication station having a **phase conjugator** with a
top electrode, wherein an aperture is located in said top electrode.

19 The...

...18, wherein the interrogating beam
interacts with at least one pump beam operating in the **phase conjugator**
at a substantially transverse angle.

20 The system of claim 18, wherein the phase conjugator...

...a communication station capable of receiving said interrogating

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beam; and
said communication station having a **phase conjugator** which is
a VCSEL.

23 The system of claim 22, wherein the interrogating beam
interacts with at least one pump beam operating in the **phase
conjugator**
in a substantially parallel manner.

24 An optical interconnection system comprising:
a fiber optic device...

...micro-mirror adapted to receive said interrogating beam and
transmit the beam to a predetermined **phase conjugator** .

25 The system of claim 24, wherein said phase conjugator is a
VCSEL.

26 The...

...24, wherein said interrogating beam
interacts with at least one pump beams operating in the **phase
conjugator**
in a substantially parallel manner'.

27 The system of claim 24, wherein said phase conjugator...
...24, wherein the interrogating beam
interacts with at least one pump beam operating in the **phase
conjugator**
at a transverse angle.

30 The system of claim 24, wherein said predetermined phase
conjugator...

...communication station operatively coupled to said
transmitting means and having a means for returning a **phase conjugate
beam** to said transmitting and receiving means.

35 A method comprising:
transmitting an interrogating beam from a transceiver;
receiving said interrogating beam at a communication station;
encoding data onto a **phase conjugate beam** data and pumping
the encoded **phase conjugate** reflectivity by nondegenerate four wave
mixing; and
transmitting the encoded **phase conjugate beam** back to the
transceiver.

36 A method comprising:
transmitting an interrogating beam from a transceiver;
receiving said interrogating beam at an array of **phase
conjugators** ;
modulating data onto a **phase conjugate beam** ; and
transmitting the **phase conjugate beam** to said transceiver.

37 The method of claim 36, further comprising:
collecting data through a in each of said **phase
conjugators** in a substantially parallel manner.

39 The method of claim 36, wherein said interrogating beam
interacts with at least on pump beam operating in each of said **phase
conjugators** in a substantially transverse manner.

40 A method comprising:
transmitting an interrogating beam from a transceiver;
receiving said interrogating beam at an array of **phase**

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conjugators through apertures located in the top electrodes of the **phase**

conjugators ;

modulating data onto a **phase conjugate beam** ; and
transmitting the **phase conjugate beam** to said transceiver.

41 A method comprising:

transmitting an interrogating beam from a transceiver;
receiving said interrogating beam at an array of **phase**

conjugators and

resolving a substantial portion of the spatial components of the input
wavefront of the **interrogating beam** ;

modulating data onto a **phase conjugate beam** ; and
transmitting the **phase conjugate beam** to said transceiver.

42 A method of providing an optical interconnect comprising:
transmitting an interrogating...

...micro-mirror across free
space;

transmitting a second beam from micro-mirror to a
predetermined **phase conjugator** .

43 The method of claim 42,
modulating data onto said second beam at said predetermined.

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8/5,K/1 (Item 1 from file: 348)
DIALOG(R) File 348:EUROPEAN PATENTS
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00937342

Optical element for a laser
Optisches Element für einen Laser
Element optique pour laser

PATENT ASSIGNEE:

REGENTS OF THE UNIVERSITY OF MINNESOTA, (267576), Morrill Hall, 100
Church Street S.E., Minneapolis MN 55455, (US), (applicant designated
states: AT;BE;CH;DE;DK;ES;FR;GB;GR;IE;IT;LI;LU;MC;NL;PT;SE)

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PATENT (CC, No, Kind, Date): EP 852415 A2 980708 (Basic)
EP 852415 A3 981111

APPLICATION (CC, No, Date): EP 98200675 950505;

PRIORITY (CC, No, Date): US 239028 940506; US 433815 950504

DESIGNATED STATES: AT; BE; CH; DE; DK; ES; FR; GB; GR; IE; IT; LI; LU; MC;
NL; PT; SE

RELATED PARENT NUMBER(S) - PN (AN):

EP 758495 (EP 959212358)

INTERNATIONAL PATENT CLASS: H01S-003/10; H01S-003/08; G02B-005/18;

ABSTRACT EP 852415 A2

Method for making a distortion-compensating phase-adjustment element
for a laser. One type of distortion to be compensated for is heat
distortion. Also described is a method for making a custom
phase-conjugating diffractive mirror for a laser resonator comprising the
steps of: (a) choosing a specified beam mode profile $a_1(x,y)$; (b)
calculating the mode profile $b(x',y')$ which is a value of the specified
beam $a_1(x,y)$ that is propagated to the reflection surface of the
diffractive mirror and (c) calculating mirror reflectance $t(x',y')$ which
reflects phase conjugate of $b(x',y')$ and corrects for distortions such as
heat. A method for fabricating such a mirror is shown. Another aspect of
the invention is the addition of a phase adjusting element into a laser
resonator, and compensating for the addition of a phase adjusting element
in the design of other phase-adjusting elements such as the mirrors and
correcting for distortions such as heat.

ABSTRACT WORD COUNT: 149

LEGAL STATUS (Type, Pub Date, Kind, Text):

Assignee: 001108 A2 Transfer of rights to new applicant: REGENTS OF
THE UNIVERSITY OF MINNESOTA (267571) 600
University Gateway, 200 Oak Street SE
Minneapolis, MN 55455-2070 US

Examination: 20000209 A2 Date of dispatch of the first examination
report: 19991221

Withdrawal: 020227 A2 Date application deemed withdrawn: 20010816

Application: 980708 A2 Published application (A1with Search Report
;A2without Search Report)

Search Report: 981111 A3 Separate publication of the European or
International search report

Examination: 990526 A2 Date of filing of request for examination:
990326

LANGUAGE (Publication,Procedural,Application): English; English; English

FULLTEXT AVAILABILITY:

Available Text	Language	Update	Word Count
CLAIMS A	(English)	9828	1868
SPEC A	(English)	9828	15650
Total word count - document A			17518

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Total word count - document B 0
Total word count - documents A + B 17518

...SPECIFICATION cavity length.

 In conclusion, a new type of laser resonator was implemented that employs an **intra - cavity** phase plate and a diffractive mode-selecting mirror to produce large-diameter fundamental modes in...

...order modes designed to effectively insure single-spatial-mode operation.

A Laser Using Two Custom **Phase - Conjugated** Diffractive Mirrors

 A diffractive laser cavity mirror is described in the discussion for Figure 2...

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12/3,K/1 (Item 1 from file: 348)
DIALOG(R)File 348:EUROPEAN PATENTS
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01423685

Holographic recording and reproducing apparatus and method
Vorrichtung und Verfahren zur Aufnahme und Wiedergabe von Hologrammen
Methode et dispositif d'enregistrement et de reproduction d'hologrammes
PATENT ASSIGNEE:

Pioneer Corporation, (2812420), 4-1 Meguro 1-chome, Meguro-ku, Tokyo,
(JP), (Applicant designated States: all)

INVENTOR:

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LEGAL REPRESENTATIVE:

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PATENT (CC, No, Kind, Date): EP 1202137 A2 020502 (Basic)

APPLICATION (CC, No, Date): EP 2001125863 011030;

PRIORITY (CC, No, Date): JP 2000332825 001031

DESIGNATED STATES: AT; BE; CH; CY; DE; DK; ES; FI; FR; GB; GR; IE; IT; LI;
LU; MC; NL; PT; SE; TR

EXTENDED DESIGNATED STATES: AL; LT; LV; MK; RO; SI

INTERNATIONAL PATENT CLASS: G03H-001/04; G11C-013/04

ABSTRACT WORD COUNT: 218

NOTE:

Figure number on first page: NONE

LANGUAGE (Publication,Procedural,Application): English; English; English

FULLTEXT AVAILABILITY:

Available Text	Language	Update	Word Count
CLAIMS A	(English)	200218	916
SPEC A	(English)	200218	5753
Total word count - document A			6669
Total word count - document B			0
Total word count - documents A + B			6669

...ABSTRACT into the recording medium such that the signal light beam intersects with the reference light **beam** to **produce** an optical interference pattern with the reference and signal light beams within the recording medium...

...opposite direction along the optical axis of the recording reference light beam to generate a **phase conjugate** wave from a refractive-index grating of the light interference pattern; a splitting portion for splitting the **phase conjugate** wave from the optical path of the signal light beam to image a dot pattern with the **phase conjugate** wave; a photo-detecting portion for detecting the dot pattern imaged with the **phase conjugate** wave to reproduce the image data.

...CLAIMS lens and said converging lens; and during both the irradiation of the recording reference light **beam** and the **production** of the **phase conjugate** wave, forwarding a reproduced light from the real image to said converging lens to converge...

...medium in such a manner that said reproduced light intersects with the recording reference light **beam** to **produce** an optical interference pattern of refractive index at a different portion away from said reproduction...

12/3,K/2 (Item 2 from file: 348)
DIALOG(R)File 348:EUROPEAN PATENTS

November 5, 2002

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01420854

Hologram recording and reproducing apparatus

Vorrichtung zur Aufnahme und Wiedergabe von Hologrammen

Appareil pour l'enregistrement et la reproduction d'un hologram

PATENT ASSIGNEE:

Pioneer Corporation, (2812420), 4-1 Meguro 1-chome, Meguro-ku, Tokyo,
(JP), (Applicant designated States: all)

INVENTOR:

Itoh, Yoshihisa, c/o Pioneer Corporation, Corp.Res.and Development Lab.,
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Matsushita, Hajime, c/o Pioneer Corporation, Corp.Res.and Development
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LEGAL REPRESENTATIVE:

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Munchen, (DE)

PATENT (CC, No, Kind, Date): EP 1199614 A2 020424 (Basic)

APPLICATION (CC, No, Date): EP 2001124722 011016;

PRIORITY (CC, No, Date): JP 2000316117 001017

DESIGNATED STATES: AT; BE; CH; CY; DE; DK; ES; FI; FR; GB; GR; IE; IT; LI;
LU; MC; NL; PT; SE; TR

EXTENDED DESIGNATED STATES: AL; LT; LV; MK; RO; SI

INTERNATIONAL PATENT CLASS: G03H-001/04

ABSTRACT WORD COUNT: 218

NOTE:

Figure number on first page: 2

LANGUAGE (Publication,Procedural,Application): English; English; English

FULLTEXT AVAILABILITY:

Available Text	Language	Update	Word Count
CLAIMS A	(English)	200217	403
SPEC A	(English)	200217	5440
Total word count - document A			5843
Total word count - document B			0
Total word count - documents A + B			5843

...ABSTRACT into the recording medium such that the signal light beam intersects with the reference light **beam** to **produce** an optical interference pattern with the reference and signal light beams within the recording medium...

...opposite direction along the optical axis of the recording reference light beam to generate a **phase conjugation** wave from a refractive-index grating of the light interference pattern; a splitting portion for splitting the **phase conjugation** wave from the optical path of the signal light beam to image a dot pattern with the **phase conjugation** wave; a photo-detecting portion for detecting the dot pattern imaged with the **phase conjugation** wave to reproduce the image data.

12/3,K/3 (Item 3 from file: 348)

DIALOG(R)File 348:EUROPEAN PATENTS

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00935482

OPTICAL FIBER COMMUNICATION SYSTEM USING OPTICAL PHASE CONJUGATE, APPARATUS APPLICABLE TO THE SYSTEM AND ITS MANUFACTURING METHOD

FASEROPTISCHES UBERTRAGUNGSSYSTEM MIT OPTISCHER PHASENKONJUGATION, FUR DAS SYSTEM GEEIGNETE VORRICHTUNG UND IHR HERSTELLUNGSVERFAHREN

SYSTEME DE COMMUNICATION A FIBRE OPTIQUE UTILISANT UN CONJUGUE DE LA PHASE OPTIQUE, APPAREIL APPLICABLE AU SYSTEME ET SON PROCEDE DE FABRICATION

PATENT ASSIGNEE:

FUJITSU LIMITED, (211463), 1-1, Kamikodanaka 4-chome, Nakahara-ku,

November 5, 2002

Kawasaki-shi, Kanagawa 211-8588, (JP), (applicant designated states:
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INVENTOR:

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PATENT (CC, No, Kind, Date): EP 862078 A1 980902 (Basic)

WO 9808138 980226

APPLICATION (CC, No, Date): EP 97935861 970822; WO 97JP2926 970822

PRIORITY (CC, No, Date): JP 96221274 960822

DESIGNATED STATES: DE; FR; GB; IT

INTERNATIONAL PATENT CLASS: G02F-001/35; H04B-010/18;

ABSTRACT WORD COUNT: 167

LANGUAGE (Publication,Procedural,Application): English; English; Japanese
FULLTEXT AVAILABILITY:

Available Text	Language	Update	Word Count
CLAIMS A	(English)	9836	4665
SPEC A	(English)	9836	20568
Total word count - document A			25233
Total word count - document B			0
Total word count - documents A + B			25233

...CLAIMS said second optical fiber and having a pass-band including the
wavelength of the first **phase conjugate beam** , whereby noise
produced by said optical amplifier is removed.
15. An optical fiber communication system according to claim...a fourth
end which correspond to an input end and an output end for the **phase**
conjugate beam , respectively;
the **product** of the average value of the chromatic dispersion and the
length of said first optical...

12/3,K/4 (Item 4 from file: 348)

DIALOG(R)File 348:EUROPEAN PATENTS

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00905496

Ozone compatible stimulated brillouin scattering materials

Ozonvertragliche Materialien fur stimulierte Brillouin-Streuung

Materiaux compatibles avec l'ozon pour la diffusion Brillouin stimulee

PATENT ASSIGNEE:

TRW INC., (376410), One Space Park Building E2/7073, Redondo Beach, CA
90278, (US), (Applicant designated States: all)

INVENTOR:

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LEGAL REPRESENTATIVE:

Schmidt, Steffen J., Dipl.-Ing. (70552), Wuesthoff & Wuesthoff, Patent-
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PATENT (CC, No, Kind, Date): EP 827012 A2 980304 (Basic)

EP 827012 A3 000621

APPLICATION (CC, No, Date): EP 97114375 970820;

PRIORITY (CC, No, Date): US 697649 960828

DESIGNATED STATES: DE; FR; GB

INTERNATIONAL PATENT CLASS: H01S-003/30; G02F-001/35

ABSTRACT WORD COUNT: 202

NOTE:

Figure number on first page: NONE

LANGUAGE (Publication,Procedural,Application): English; English; English
FULLTEXT AVAILABILITY:

November 5, 2002

Available Text	Language	Update	Word Count
CLAIMS A	(English)	9810	377
SPEC A	(English)	9810	1879
Total word count - document A			2256
Total word count - document B			0
Total word count - documents A + B			2256

...ABSTRACT A2

A device for producing **phase conjugation** of electromagnetic radiation using stimulated Brillouin scattering (SBS), comprising an SBS cell having a liquid...

...aberrations created when the beam passes through an amplifying medium comprising the step of generating **phase conjugation** by SBS using a liquid perfluorocarbon as an SBS medium. Further, a method of **producing** an output **laser beam** comprising the steps of, generating an initial laser beam using a laser and **phase conjugating** the initial laser beam by SBS using a liquid perfluorocarbon medium as an SBS medium...

12/3,K/5 (Item 5 from file: 348)

DIALOG(R) File 348:EUROPEAN PATENTS

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00836733

Phase conjugate wave generating device, wavelength converting method, optical dispersion compensation method and multi-wavelength light generating device

Vorrichtung zur Erzeugung phasenkonjugierter Wellen, Verfahren zur Umwandlung optischer Wellenlängen, optisches Dispersionskompensationsverfahren, und Mehrfachw

Dispositif a generation d'ondes optiques a conjugaison de phase, methode de conversion de longueur d'onde, methode de compensation de dispersion optique et disp

PATENT ASSIGNEE:

FUJITSU LIMITED, (211463), 1-1, Kamikodanaka 4-chome, Nakahara-ku, Kawasaki-shi, Kanagawa 211, (JP), (applicant designated states: DE;FR;GB)

INVENTOR:

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LEGAL REPRESENTATIVE:

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PATENT (CC, No, Kind, Date): EP 774810 A2 970521 (Basic)
EP 774810 A3 980812

APPLICATION (CC, No, Date): EP 96308248 961114;

PRIORITY (CC, No, Date): JP 95296524 951115; JP 96250710 960920

DESIGNATED STATES: DE; FR; GB

INTERNATIONAL PATENT CLASS: H01S-003/25; G02F-001/35; H04B-010/18;

ABSTRACT WORD COUNT: 127

LANGUAGE (Publication,Procedural,Application): English; English; English

FULLTEXT AVAILABILITY:

Available Text	Language	Update	Word Count
CLAIMS A	(English)	EPAB97	775
SPEC A	(English)	EPAB97	5123
Total word count - document A			5898
Total word count - document B			0
Total word count - documents A + B			5898

...ABSTRACT films (22X) coated on a light input end and a light output end to transmit **phase conjugate** waves a **probe beam** light source for injecting the **probe beam** into the light input end of the distributed feedback semiconductor laser (1), a current supplying...

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...semiconductor laser (1) to oscillate a pump beams and a lens system (6) for extracting **phase conjugate** wave which is output from the light output end of the distributed feedback semiconductor laser (1) by injecting the **probe beam** into the distributed feedback semiconductor laser (1) which is oscillating the pump beam.

...CLAIMS feedback semiconductor laser (1) to oscillate a pump beam; and means (8) for detecting said **phase conjugate** waves output from said optical output end of said distributed feedback semiconductor laser (1) by injecting said **probe beam** into said distributed feedback semiconductor laser (1) which is for oscillating said pump beam.

2...

...end of said distributed feedback semiconductor laser (1), whilst in an oscillation state, with a **probe beam**, so as to emit **phase conjugate** wave light from said optical output end.

7. An optical dispersion compensating method comprising the...

...fiber (2) into said optical input end of said distributed feedback semiconductor laser; and outputting **phase conjugate** wave light, which is output from said distributed feedback semiconductor laser (1) by inputting said **probe beam**, from a second optical fiber (4) having a length identical to that of said first optical fiber (1) after said **probe beam** has been restored to its original waveform by compensating said dispersion by being passed through...

12/3,K/6 (Item 6 from file: 348)

DIALOG(R)File 348:EUROPEAN PATENTS

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00818698

Variable coherence length high brightness laser architecture

Hochintensitätslaserarchitektur mit variabler Kohärenzlänge

Architecture de laser a haute intensite a longueur de coherence variable

PATENT ASSIGNEE:

TRW INC., (376412), One Space Park, Bldg. E1/4021, Redondo Beach, California 90278, (US), (applicant designated states: DE;FR;GB)

INVENTOR:

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PATENT (CC, No, Kind, Date): EP 762578 A2 970312 (Basic)

EP 762578 A3 980128

APPLICATION (CC, No, Date): EP 96111773 960722;

PRIORITY (CC, No, Date): US 520349 950828

DESIGNATED STATES: DE; FR; GB

INTERNATIONAL PATENT CLASS: H01S-003/23; H01S-003/10; H01S-003/00;

ABSTRACT WORD COUNT: 182

LANGUAGE (Publication,Procedural,Application): English; English; English

FULLTEXT AVAILABILITY:

Available Text	Language	Update	Word Count
CLAIMS A	(English)	EPAB97	524
SPEC A	(English)	EPAB97	2394
Total word count - document A			2918
Total word count - document B			0

November 5, 2002

Total word count - documents A + B 2918

...ABSTRACT a resonant electro-optical modulator and a source of radio-frequency (rf) modulation voltage, to **produce** a modulator output **beam** having sidebands spaced on each side of the nominal frequency of the single-mode laser...

...modulator. In another embodiment of the invention, the modulator is installed in a PC MOPA (**phase conjugated** master oscillator power amplifier) configuration to provide modulation only on the return path of the beam from a **phase conjugation** device having a stimulated Brillouin scattering (SBS) medium. Because the electro-optical modulator is sensitive...

12/3,K/7 (Item 7 from file: 348)
DIALOG(R)File 348:EUROPEAN PATENTS
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00684401

Birefringence-compensated alignment-insensitive frequency doubler
Ausrichtungsunempfindlicher Frequenzverdoppler mit Doppelbrechnungskompensation

Doubleur de frequence insensible a l'alignement avec compensation de birefringence

PATENT ASSIGNEE:

TRW INC., (376412), One Space Park, Bldg. E1/4021, Redondo Beach,
California 90278, (US), (applicant designated states: DE;FR;GB)

INVENTOR:

Heflinger, Lee O., 5001 Paseo de Pablo, Torrance, California 90505, (US)
Simmons, William W., 4181 Maritime Road, Rancho Palos Verdes, California
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St. Pierre, Randall J., 928 Sixth Street, Apt. 2, Santa Monica,
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Injeyan, Hagop (NMI), 1950 Fern Lane, Glendale, California 91208, (US)

LEGAL REPRESENTATIVE:

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Patent- und Rechtsanwälte, Schweigerstrasse 2, 81541 Munchen, (DE)

PATENT (CC, No, Kind, Date): EP 654876 A1 950524 (Basic)
EP 654876 B1 981111

APPLICATION (CC, No, Date): EP 94114220 940909;

PRIORITY (CC, No, Date): US 152647 931112

DESIGNATED STATES: DE; FR; GB

INTERNATIONAL PATENT CLASS: H01S-003/109; G02F-001/37;

ABSTRACT WORD COUNT: 151

LANGUAGE (Publication,Procedural,Application): English; English; English

FULLTEXT AVAILABILITY:

Available Text	Language	Update	Word Count
CLAIMS B	(English)	9846	940
CLAIMS B	(German)	9846	823
CLAIMS B	(French)	9846	1056
SPEC B	(English)	9846	2309

Total word count - document A 0

Total word count - document B 5128

Total word count - documents A + B 5128

...CLAIMS beam from the master oscillator to said first Type II frequency doubler crystal (10) to **produce** an output **beam** having a second harmonic frequency component and a residual fundamental frequency component;

- then passing the...

...crystal;

- amplifying the input beam from the frequency doubler;

- reflecting the amplified input beam in **phase conjugated** form

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from a **phase conjugate** cell (34);
- cancelling substantially all aberrations introduced into the input beam in the frequency doubler...

12/3,K/8 (Item 8 from file: 348)
DIALOG(R)File 348:EUROPEAN PATENTS
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00681865

High brightness solid-state laser with zig-zag amplifier
Festkorperlaser hoher Helligkeit mit Zickzack-Verstärker
Laser a materiau solide a haute brillance avec amplificateur a zig-zag
PATENT ASSIGNEE:

TRW INC., (376412), One Space Park, Bldg. E1/4021, Redondo Beach,
California 90278, (US), (applicant designated states: DE;FR;GB)

INVENTOR:

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Hilyard, Rodger C., 16831 Laveda, Canyon Country, California 91351-1724,
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Harpole, George M., 812 Eastman Place, San Pedro, California 90731, (US)
Hoefler, Carolyn S., 2712 Foosse Road, Malibu, California 90265, (US)

LEGAL REPRESENTATIVE:

Schmidt, Steffen J., Dipl.-Ing. et al (70552), Wuesthoff & Wuesthoff,
Patent- und Rechtsanwälte, Schweigerstrasse 2, 81541 Munchen, (DE)

PATENT (CC, No, Kind, Date): EP 652616 A1 950510 (Basic)
EP 652616 B1 981111

APPLICATION (CC, No, Date): EP 94114221 940909;

PRIORITY (CC, No, Date): US 148758 931105

DESIGNATED STATES: DE; FR; GB

INTERNATIONAL PATENT CLASS: H01S-003/23; H01S-003/042; H01S-003/06;

H01S-003/094; H01S-003/0941;

ABSTRACT WORD COUNT: 256

LANGUAGE (Publication,Procedural,Application): English; English; English

FULLTEXT AVAILABILITY:

Available Text	Language	Update	Word Count
CLAIMS B	(English)	9846	1293
CLAIMS B	(German)	9846	1185
CLAIMS B	(French)	9846	1522
SPEC B	(English)	9846	3759
Total word count - document A			0
Total word count - document B			7759
Total word count - documents A + B			7759

...ABSTRACT A1

A solid-state **laser** architecture **producing** a **beam** of extremely high quality and brightness, including a master oscillator (10) operating in conjunction with a zig-zag amplifier (16,30), an image relaying telescope (17) and a **phase conjugation** cell (20). One embodiment of the laser architecture compensates for birefringence that is thermally induced in the amplifier (16), but injects linearly polarized light into the **phase conjugation** cell (20). Another embodiment (19) injects circularly polarized light into the **phase conjugation** cell (20) and includes optical components that eliminate birefringence effects arising in a first pass...

12/3,K/9 (Item 9 from file: 348)
DIALOG(R)File 348:EUROPEAN PATENTS
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00669907

November 5, 2002

Polarization-insensitive optical four-photon mixer.
Polarisationsunempfindlicher Vierwellenmischer.
Melangeur de quatre ondes independent de la polarisation.

PATENT ASSIGNEE:

AT&T Corp., (589370), 32 Avenue of the Americas, New York, NY 10013-2412,
(US), (applicant designated states: DE;DK;ES;FR;GB;GR;IT)
SIEMENS AKTIENGESELLSCHAFT, (200520), Wittelsbacherplatz 2, D-80333
Munchen, (DE), (applicant designated states: DE;DK;ES;FR;GB;GR;IT)

INVENTOR:

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LEGAL REPRESENTATIVE:

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PATENT (CC, No, Kind, Date): EP 643320 A2 950315 (Basic)
EP 643320 A3 960228

APPLICATION (CC, No, Date): EP 94306420 940831;

PRIORITY (CC, No, Date): US 120013 930910

DESIGNATED STATES: DE; DK; ES; FR; GB; GR; IT

INTERNATIONAL PATENT CLASS: G02F-001/35; H04B-010/18;

ABSTRACT WORD COUNT: 125

LANGUAGE (Publication,Procedural,Application): English; English; English

FULLTEXT AVAILABILITY:

Available Text	Language	Update	Word Count
CLAIMS A	(English)	EPAB95	1391
SPEC A	(English)	EPAB95	5316
Total word count - document A			6707
Total word count - document B			0
Total word count - documents A + B			6707

...CLAIMS a combined signal;

said nonlinear mixing device adapted to receive said combined
signal from said **beam** combiner and to **produce** said mixing
products of said pump signal and said one of said components of said
optical signal, one of said mixing products representing a **phase**
conjugate of said one of said components of said optical signal.

9. The optical mixer of...

12/3,K/10 (Item 10 from file: 348)

DIALOG(R)File 348:EUROPEAN PATENTS

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00460176

**Optical phase conjugation apparatus including light pipe for multiple beam
combination.**

**Vorrichtung zur optischen Phasenkonjugation mit Lichtleitkorper zur
Überlagerung mehrerer Strahlen.**

**Dispositif de conjugaison de phase optique avec guide de lumiere pour
combinaison de plusieurs rayons lumineux.**

PATENT ASSIGNEE:

HUGHES AIRCRAFT COMPANY, (214919), 7200 Hughes Terrace, Los Angeles, CA
90045-0066, (US), (applicant designated states:
BE;CH;DE;ES;FR;GB;IT;LI;NL;SE)

INVENTOR:

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LEGAL REPRESENTATIVE:

Witte, Alexander, Dr.-Ing. (46523), Witte, Weller, Gahlert & Otten
Patentanwalte Augustenstrasse 14, W-7000 Stuttgart 1, (DE)

PATENT (CC, No, Kind, Date): EP 452838 A1 911023 (Basic)

APPLICATION (CC, No, Date): EP 91105936 910413;

PRIORITY (CC, No, Date): US 511665 900420

DESIGNATED STATES: BE; CH; DE; ES; FR; GB; IT; LI; NL; SE

November 5, 2002

INTERNATIONAL PATENT CLASS: G02F-001/35; G02B-027/10;
ABSTRACT WORD COUNT: 154

LANGUAGE (Publication,Procedural,Application): English; English; English
FULLTEXT AVAILABILITY:

Available Text	Language	Update	Word Count
CLAIMS A	(English)	EPABF1	1521
SPEC A	(English)	EPABF1	4583
Total word count - document A			6104
Total word count - document B			0
Total word count - documents A + B			6104

...CLAIMS pipe (38; 64; 100) such that they are substantially parallel to each other.

17. A **phase conjugate**, master oscillator-power amplifier apparatus having light source means (54) for producing a single coherent light beam (56), having beam splitting means (58; 76; 84) for splitting the single light **beam** (56) to **produce** a plurality of input light beams (56a-56c) and having power amplifier means (60; 90) for amplifying the input light beams (56a-56c), characterized by **phase conjugate** mirror means (68) for **phase conjugating** the input light beams (56a-56c) which emerge from the power amplifier means (60; 90) and reflecting the **phase conjugated** light beams back through the power amplifier means (60; 90), wherein further:
- optical light pipe...

...and

- second optical means (66) are disposed between the light pipe means (64) and the **phase conjugate** mirror means (68) for focussing said combined light beams emerging from the second end of the light pipe means (64) into the **phase conjugate** mirror means (68) at a predetermined position therein and with a predetermined beam diameter.

18...

12/3,K/11 (Item 11 from file: 348)
DIALOG(R)File 348:EUROPEAN PATENTS
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00423262

Master oscillator power amplifier with interference isolated oscillator.
Hauptoszillator-Leistungsverstärker mit durch Interferenz isoliertem Oszillator.

Amplificateur de puissance a oscillateur principal avec oscillateur isole par interference.

PATENT ASSIGNEE:

HUGHES AIRCRAFT COMPANY, (214919), 7200 Hughes Terrace, Los Angeles, CA 90045-0066, (US), (applicant designated states: DE;FR;GB;IT)

INVENTOR:

O'Meara, Thomas R., 5961 Floris Heights, Malibu, CA 90265, (US)

LEGAL REPRESENTATIVE:

Kuhnen, Wacker & Partner (100051), Schneggstrasse 3-5 Postfach 1553, W-8050 Freising, (DE)

PATENT (CC, No, Kind, Date): EP 428923 A2 910529 (Basic)
EP 428923 A3 920325

APPLICATION (CC, No, Date): EP 90121015 901102;

PRIORITY (CC, No, Date): US 439212 891120

DESIGNATED STATES: DE; FR; GB; IT

INTERNATIONAL PATENT CLASS: H01S-003/23;

ABSTRACT WORD COUNT: 171

LANGUAGE (Publication,Procedural,Application): English; English; English
FULLTEXT AVAILABILITY:

Available Text	Language	Update	Word Count
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November 5, 2002

CLAIMS A	(English)	EPABF1	2325
SPEC A	(English)	EPABF1	2952
Total word count - document A			5277
Total word count - document B			0
Total word count - documents A + B			5277

...CLAIMS at the MO wavelength, whereby said first and second beam components interact at the second **beam** splitter to **produce** a constructive interference output beam,
an optical amplifier positioned in the path of said constructive interference output beam to amplify said beam in a first amplifying pass,
a **phase conjugate** mirror (PCM) positioned to receive the amplified beam and to direct a **phase conjugate** of the amplified beam back to said amplifier for a second amplifying pass, said **phase conjugate** beam being shifted from the input beam by a predetermined frequency shift and being directed from said amplifier back to said second beam splitter, said second beam splitter splitting the **phase conjugate** beam into first and second components directed by said beam directing means back to said at the **phase conjugate** beam wavelength, whereby said **phase conjugate** beam components undergo destructive interference at said first beam splitter back along said input path towards the MO, and constructive interference to **produce** an output **beam** along an output path which does not enter the MO.
16. The MOPA of claim...

...at the beam wavelength, whereby said first and second beam components interact at the second **beam** splitter to **produce** a constructive interference output beam,
an optical amplifier positioned in the path of said constructive interference output beam to amplify said beam in a first amplifying pass,
a **phase conjugate** mirror (PCM) positioned to receive the amplified beam and to direct a **phase conjugate** of the amplified beam back to said amplifier for a second amplifying pass, said **phase conjugate** beam being shifted from the input beam by a predetermined frequency shift and being directed from said amplifier back to said second beam splitter, said second beam splitter splitting the **phase conjugate** beam into first and second components directed by said beam directing means back to said...

...paths differing in effective length by approximately an odd number of half-wavelengths at the **phase conjugate** beam wavelength, whereby said **phase conjugate** beam components undergo destructive interference at said first beam splitter back along said input path and constructive interference to **produce** an output **beam** along an output path which differs from said input path.
27. The power amplifier of...

12/3,K/12 (Item 12 from file: 348)
DIALOG(R) File 348:EUROPEAN PATENTS
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00421034

Self-pumped, optical phase conjugation method and apparatus using pseudo-conjugator to produce retroreflected seed beam.

Verfahren mit sich selbstpumpender optischer Phasenkonjugation und Vorrichtung zur Erzeugung eines retroreflektierten Kernstrahls mittels Pseudokonjugator.

Methode de conjugaison de phase optique a auto-pompage et appareil pour produire un germe lumineux retroreflechi utilisant un pseudo-conjugeur.

PATENT ASSIGNEE:

November 5, 2002

HUGHES AIRCRAFT COMPANY, (214919), 7200 Hughes Terrace, Los Angeles, CA
90045-0066, (US), (applicant designated states: DE;ES;FR;GB;IT;NL)

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LEGAL REPRESENTATIVE:

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PATENT (CC, No, Kind, Date): EP 422468 A2 910417 (Basic)
EP 422468 A3 920415

APPLICATION (CC, No, Date): EP 90118740 900928;

PRIORITY (CC, No, Date): US 419308 891010

DESIGNATED STATES: DE; ES; FR; GB; IT; NL

INTERNATIONAL PATENT CLASS: G02F-001/35; H01S-003/23;

ABSTRACT WORD COUNT: 164

LANGUAGE (Publication,Procedural,Application): English; English; English
FULLTEXT AVAILABILITY:

Available Text	Language	Update	Word Count
CLAIMS A	(English)	EPABF1	1734
SPEC A	(English)	EPABF1	5366
Total word count - document A			7100
Total word count - document B			0
Total word count - documents A + B			7100

**Self-pumped, optical phase conjugation method and apparatus using
pseudo-conjugator to produce retroreflected seed beam .**

...CLAIMS back into the respective media in coherent coupled relation with
each other.

26. An optical **phase conjugation** apparatus, comprising:
a first non-linear optical medium;
a second non-linear optical medium;
pseudo...

...conjugate beams in the first medium constituting reference beams; and
means for directing an optical **probe beam** into the first medium
at an angle relative to the reference beams predetermined to generate
a **phase conjugate** reflected beam through interaction of the
probe beam with the reference beams.

27. An optical **phase conjugation** apparatus, comprising:
a first non-linear optical medium;
a second non-linear optical medium;
pseudo the first medium constituting reference beams; and
means for directing a plurality of optical **probe beams** into the
first medium at angles relative to the reference beams predetermined
to generate respective **phase conjugate** reflected beams which are
coherently coupled with each other through interaction of the **probe
beams** with the reference beams.

28. An apparatus as in claim 27, in which the probe beams are
non-parallel to each other.

29. An optical **phase conjugation** apparatus, comprising:
a plurality of first non-linear optical media;
a second non-linear optical...

...conjugate beam in each first medium constituting reference beams; and
means for directing an optical **probe beam** into each respective
first medium at an angle relative to the reference beams
predetermined to generate a **phase conjugate** reflected beam
through interaction of the **probe beam** with the reference beams.

30. A method of self-pumped phase conjugation of an optical...

...pumped conjugate beams in the first medium constituting reference beams;
and

(c) directing an optical **probe beam** into the first medium at an
angle relative to the reference beams predetermined to generate a

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phase conjugate reflected beam through interaction of the **probe beam** with the reference beams.

38. A method of optical phase conjugation, comprising the steps of...

...beams in the first medium constituting reference beams; and

(c) directing a plurality of optical **probe beams** into the first medium at angles relative to the reference beams predetermined to generate respective **phase conjugate** reflected beams which are coherently coupled with each other through interaction of the **probe beams** with the reference beams.

39. A method of optical phase conjugation, comprising the steps of...

...pumped conjugate beams in each first medium constituting reference beams; and

(d) directing an optical **probe beam** into each of the respective first media at an angle relative to the reference beams predetermined to generate a **phase conjugate** reflected beam through interaction of the **probe beam** with the reference beams. ...

12/3,K/13 (Item 13 from file: 348)

DIALOG(R)File 348:EUROPEAN PATENTS

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00413915

Phase conjugate laser with a temporal square pulse.

Phasenkonjugierter Laser mit zeitlichem Rechteckpuls.

Laser a phase conjuguee avec une impulsion temporelle carree.

PATENT ASSIGNEE:

Hughes Aircraft Company, (214913), 7200 Hughes Terrace P.O. Box 45066,
Los Angeles, California 90045-0066, (US), (applicant designated states:
BE;CH;DE;ES;FR;GB;IT;LI;NL;SE)

INVENTOR:

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PATENT (CC, No, Kind, Date): EP 405195 A2 910102 (Basic)
EP 405195 A3 911227

APPLICATION (CC, No, Date): EP 90110713 900606;

PRIORITY (CC, No, Date): US 372503 890628

DESIGNATED STATES: BE; CH; DE; ES; FR; GB; IT; LI; NL; SE

INTERNATIONAL PATENT CLASS: H01S-003/23; H01S-003/10;

ABSTRACT WORD COUNT: 308

LANGUAGE (Publication,Procedural,Application): English; English; English

FULLTEXT AVAILABILITY:

Available Text	Language	Update	Word Count
CLAIMS A	(English)	EPABF1	995
SPEC A	(English)	EPABF1	1721
Total word count - document A			2716
Total word count - document B			0
Total word count - documents A + B			2716

...ABSTRACT A2

A system and method for **producing** relatively square **laser** pulses derived from relatively Gaussian laser pulses. The system (10) comprises a **phase conjugate** laser system that comprises a laser oscillator (11), an amplifying medium (15) and a **phase conjugate** mirror (18) having a nonlinear medium confined at a predetermined pressure. The mirror (18) is...

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...that has a gas confined therein at a predetermined pressure. The plasma switch (12) and **phase conjugate** mirror (18) cooperate to truncate the **laser** pulse to **produce** a **laser** pulse having a relatively square shape. Controlling the pressures in the plasma switch (12) and **phase conjugate** mirror (18) provides a means of controlling the formation of square-shaped laser pulses. In...

...15) to amplify the laser pulse. The amplified laser pulse is then reflected from a **phase conjugate** mirror (18). The pressure in the **phase conjugate** mirror (18) is adjusted to a predetermined pressure to truncate the front portion of the **laser** pulse, thus **producing** a relatively square output pulse. Additionally, the relative length of a delay line (16) disposed...

...CLAIMS amplifying path and adapted to rotate the polarization of an applied laser pulse.

2. A **phase conjugate** laser comprising:
a laser oscillator;
a **phase conjugate** mirror having a nonlinear medium therein confined at a predetermined pressure that is adapted to...

...of an applied laser pulse;
an amplifying medium disposed between the laser oscillator and the **phase conjugate** mirror for amplifying an applied laser pulse;
a plasma switch disposed between the laser oscillator...

...at a predetermined pressure that is adapted to truncate a predetermined rear portion of the **laser** pulse to **produce** a **laser** pulse having a relatively square shape.

3. A **phase conjugate** laser comprising:
a laser oscillator;
a **phase conjugate** mirror having a nonlinear medium therein confined at a predetermined pressure that is adapted to...

...of an applied laser pulse;
an amplifying medium disposed between the laser oscillator and the **phase conjugate** mirror for amplifying an applied laser pulse;
a plasma switch disposed between the laser oscillator...

...therein at a predetermined pressure that is adapted to truncate the rear portion of the **laser** pulse to **produce** a **laser** pulse having a relatively square shape;

wherein the relative pressures employed in the **phase conjugate** mirror and plasma switch are determinative of the truncation of the laser pulse transmitted from the oscillator to the **phase conjugate** mirror and back, and which **produces** the **laser** pulse having a relatively square shape.

4. A method of forming a square laser pulse...

12/3,K/14 (Item 14 from file: 348)

DIALOG(R)File 348:EUROPEAN PATENTS

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00381487

OPTICAL DEVICE USING STIMULATED BRILLOUIN SCATTERING.

STIMULIERTE BRILLOUIN-STREUUNG AUSNUTZENDE OPTISCHE VORRICHTUNG.

DISPOSITIF OPTIQUE UTILISANT LA DIFFUSION BRILLOUIN STIMULEE.

PATENT ASSIGNEE:

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Los Angeles, California 90045-0066, (US), (applicant designated states:
BE;CH;DE;FR;GB;IT;LI;NL;SE)

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November 5, 2002

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PATENT (CC, No, Kind, Date): EP 339085 A1 891102 (Basic)
EP 339085 B1 930818
WO 8904009 890505

APPLICATION (CC, No, Date): EP 89900692 880906; WO 88US3082 880906

PRIORITY (CC, No, Date): US 111941 871021

DESIGNATED STATES: BE; CH; DE; FR; GB; IT; LI; NL; SE

INTERNATIONAL PATENT CLASS: G02F-001/35;

ABSTRACT WORD COUNT: 154

NOTE:

No A-document published by EPO

LANGUAGE (Publication,Procedural,Application): English; English; English

FULLTEXT AVAILABILITY:

Available Text	Language	Update	Word Count
CLAIMS B	(English)	EPBBF1	1170
CLAIMS B	(German)	EPBBF1	1073
CLAIMS B	(French)	EPBBF1	1313
SPEC B	(English)	EPBBF1	3920
Total word count - document A			0
Total word count - document B			7476
Total word count - documents A + B			7476

...CLAIMS said gain medium (2; 16; 22) by modifying the SBS steady state gain coefficient of **the gain** medium during the **application** of said **higher** optical intensity to **decrease** the SBS gain coefficient and thereby increase the fidelity of the output beam (E(sub...

...having a stimulated Brillouin scattering (SBS) gain coefficient g determining the strength of coupling between **an input** optical beam (E(sub(P))) and said gain **medium** (2; 16 ; 22), **comprising**

a) means for directing said input optical beam (E(sub(P))) having a first optical intensity...

...during the application of said first optical intensity;

b) means for increasing the optical intensity **of** the input **optical beam** (E(sub(P))) to a higher optical intensity, whereby SRS is dominated by SBS when...

12/3,K/15 (Item 15 from file: 348)

DIALOG(R)File 348:EUROPEAN PATENTS

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00341830

Broadband optical detection of transient motion from a scattering surface.

Breitbandige optische Erfassung der transienten Bewegung einer streuenden Oberfläche.

Detection optique a large bande du mouvement transitoire d'une surface dispersive.

PATENT ASSIGNEE:

NATIONAL RESEARCH COUNCIL OF CANADA, (487620), , Ottawa Ontario K1A 0R6,
(CA), (applicant designated states: AT;BE;CH;DE;ES;FR;GB;IT;LI;NL;SE)

INVENTOR:

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LEGAL REPRESENTATIVE:

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PATENT (CC, No, Kind, Date): EP 339625 A1 891102 (Basic)
EP 339625 B1 930203

November 5, 2002

APPLICATION (CC, No, Date): EP 89107608 890427;
PRIORITY (CC, No, Date): CA 565550 880429
DESIGNATED STATES: AT; BE; CH; DE; ES; FR; GB; IT; LI; NL; SE
INTERNATIONAL PATENT CLASS: G01N-029/00; G01B-009/02;
ABSTRACT WORD COUNT: 194

LANGUAGE (Publication,Procedural,Application): English; English; English
FULLTEXT AVAILABILITY:

Available Text	Language	Update	Word Count
CLAIMS B	(English)	EPBBF1	3534
CLAIMS B	(German)	EPBBF1	2056
CLAIMS B	(French)	EPBBF1	2623
SPEC B	(English)	EPBBF1	6046
Total word count - document A			0
Total word count - document B			14259
Total word count - documents A + B			14259

...CLAIMS reference beam, and for combining said reflected beam portion with said reference beam to cause **interference thereof** and **thereby** provide said **optical signal** .

26. An apparatus according to claim 25, further including a polarizing beam splitter (218) optically...

...to claim 16, wherein said sideband stripping means comprises a partially transmitting mirror and two **phase - conjugating** mirrors each made of a material having a slow refractive index phase grating formation following light interference, said partially transmitting mirror and said first and second **phase - conjugating** mirror being arranged relative to one another such that said first **phase - conjugating** mirror reflects said second scattered beam portion onto said partially transmitting mirror which in turn reflects same onto said second **phase - conjugating** mirror to obtain a reflected sideband-free beam portion defining said reference beam.

30. An...

12/3,K/16 (Item 16 from file: 348)
DIALOG(R)File 348:EUROPEAN PATENTS
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00319613

Coherent beam formation.

Bildung eines koharenten Bundels.

Etablissement d'un faisceau coherent.

PATENT ASSIGNEE:

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INVENTOR:

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Flax, Stephen Wayne, 7829 West Wisconsin Avenue, Wauwatosa Wisconsin 53213, (US)

LEGAL REPRESENTATIVE:

Pratt, Richard Wilson et al (46454), London Patent Operation G.E.

Technical Services Co. Inc. Essex House 12/13 Essex Street, London WC2R 3AA, (GB)

PATENT (CC, No, Kind, Date): EP 320303 A2 890614 (Basic)
EP 320303 A3 891011
EP 320303 B1 931027

APPLICATION (CC, No, Date): EP 88311716 881209;
PRIORITY (CC, No, Date): US 132079 871211
DESIGNATED STATES: DE; FR; NL
INTERNATIONAL PATENT CLASS: G10K-011/34;
ABSTRACT WORD COUNT: 224

November 5, 2002

LANGUAGE (Publication,Procedural,Application): English; English; English
FULLTEXT AVAILABILITY:

Available Text	Language	Update	Word Count
CLAIMS B	(English)	EPBBF1	2564
CLAIMS B	(German)	EPBBF1	1351
CLAIMS B	(French)	EPBBF1	1828
SPEC B	(English)	EPBBF1	5553
Total word count - document A			0
Total word count - document B			11296
Total word count - documents A + B			11296

...ABSTRACT A2

A method for iterative **phase conjugation** adaptive reduction of phase aberration effects upon the time delays necessary for formation of a...

...from a large collection of scatterers, contained in a portion of the medium to be **investigated**, a **probe beam** for that **beam** angle (θ). The received signals from each of the (N-1) pairs of adjacent transducers are cross-correlated to derive a like number of **phase conjugation** correction signals, which are then arithmetically operated upon to provide a time correction for the time delay associated with each **probe beam** transducer, for that range R and angle (θ). The time correction for each transducer then...

...iterations, with each excitation made with the most recent corrected delays values, better focuses the **interrogating beam**, until, after a selected number of iterations, actual imaging data can be obtained with minimal...

...CLAIMS a probe beam originating from the plurality N of transducers;
(b) cross-correlating, for each **probe beam**, the received signals from a k-th one, where $1 \leq k \leq N$, of the transducers...

...of adjacent ones of all N transducers to produce a like number (N-1) of **phase conjugation** correction signals $(\Delta)(\phi)(\text{sub}(k))$;
(c) arithmetically operating upon the plurality of **phase conjugation** correction signals $(\Delta)(\phi)(\text{sub}(k))$ to produce a time correction $(\Delta)t(\text{sub}(j(\theta)))$ for the time delay associated with that one **probe beam** at an angle (θ) and transducer j for that range R;
(d) then modifying by...

...to the j-th ones of the $(\Delta)(\phi)(\text{sub}(k))$ terms to provide the **phase conjugation** correction signal $(\phi)(\text{sub}(j(\theta)))$ for the j-th transducer of the **probe beam**.

9. The method of claim 6, wherein for each transducer 1 through (N-1), step...and for converting energy reflected thereto to a signal therefrom, comprising:

means for causing a **probe beam** from each different and sequential one of a selected set of **probe beams** to reflect from scatterers naturally contained in at least a portion of the media to be investigated and be received by substantially all transducers of the array;

phase conjugation processing means for cross-correlating, for each **probe beam**, the received signals from each k-th one, where $1 \leq k \leq N$, of the (N-1) successive pairs of adjacent transducers to produce a like number of **phase conjugation** correction signals $(\Delta)(\phi)(\text{sub}(k))$;

means for arithmetically operating upon the plurality of **phase conjugation** signals $(\Delta)(\phi)(\text{sub}(k))$ to produce a time correction $(\Delta)t(\text{sub}(j(\theta)))$.

...and focused substantially to range R;

means for causing at least one additional iteration of **probe**

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beam irradiation, reflection reception and processing to further modify the time corrections of at least one...

- ...the j -th ones of the $(\Delta)(\phi)(\text{sub}(k))$ data signals to provide the **phase conjugation** correction signal $(\phi)(\text{sub}(j(\theta)))$ for the j -th transducer last providing a **probe beam** at angle (θ) .
19. The apparatus of claim 15, wherein each processing means further includes...
- ...to the j -th ones of the $(\Delta)(\phi)(\text{sub}(k))$ terms to provide the **phase conjugation** correction signal $(\phi)(\text{sub}(j(\theta)))$ for the j -th transducer of the **probe beam**.
9. The method of claim 6, wherein for each transducer 1 through $(N-1)$, step...
- ...and for converting energy reflected thereto to a signal therefrom, comprising
- means for causing a **probe beam** from each different and sequential one of a selected set of **probe beams** to reflect from scatterers naturally contained in at least a portion of the media to
- ...
- ...be received by substantially all transducers of the array; and characterized in that it comprises
- phase conjugation** processing means for cross-correlating, for each **probe beam**, the received signals from each k -th one, where $1 \leq k \leq N$, of the $(N-1)$ successive pairs of adjacent transducers to produce a like number of **phase conjugation** correction signals $(\Delta)(\phi)(\text{sub}(k))$;
- means for arithmetically operating upon the plurality of **phase conjugation** signals $(\Delta)(\phi)(\text{sub}(k))$ to produce a time correction $(\Delta)t(\text{sub}(j(\theta)))$.
- ...and focused substantially to range R ;
- means for causing at least one additional iteration of **probe beam** irradiation, reflection reception and processing to further modify the time corrections of at least one...
- ...the j -th ones of the $(\Delta)(\phi)(\text{sub}(k))$ data signals to provide the **phase conjugation** correction signal $(\phi)(\text{sub}(j(\theta)))$ for the j -th transducer last providing a **probe beam** at angle (θ) .
19. The apparatus of claim 15, wherein each processing means further includes...

12/3,K/17 (Item 17 from file: 348)
DIALOG(R) File 348:EUROPEAN PATENTS
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00278696

SELF-PUMPED PHASE CONJUGATE MIRROR.
SELBSTGEPUMPTER PHASENKONJUGIERTER SPIEGEL.
MIROIR A CONJUGAISON DE PHASE A AUTO-POMPAGE.
PATENT ASSIGNEE:

Hughes Aircraft Company, (214913), 7200 Hughes Terrace P.O. Box 45066,
Los Angeles, California 90045-0066, (US), (applicant designated states:
BE;CH;DE;FR;GB;IT;LI;NL;SE)

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LEGAL REPRESENTATIVE:

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PATENT (CC, No, Kind, Date): EP 259374 A1 880316 (Basic)
EP 259374 B1 910904
WO 8705406 870911

November 5, 2002

APPLICATION (CC, No, Date): EP 87901192 870127; WO 87US114 870127
PRIORITY (CC, No, Date): US 836679 860305
DESIGNATED STATES: BE; CH; DE; FR; GB; IT; LI; NL; SE
INTERNATIONAL PATENT CLASS: G02F-001/35;
NOTE:

No A-document published by EPO

LANGUAGE (Publication,Procedural,Application): English; English; English
FULLTEXT AVAILABILITY:

Available Text	Language	Update	Word Count
CLAIMS B	(English)	EPBBF1	718
CLAIMS B	(German)	EPBBF1	694
CLAIMS B	(French)	EPBBF1	798
SPEC B	(English)	EPBBF1	3136
Total word count - document A			0
Total word count - document B			5346
Total word count - documents A + B			5346

...CLAIMS B1

1. A self-pumped **phase conjugate** mirror (PCM), comprising:
a crystal (18) formed from a photorefractive material and adapted to receive an optical **probe beam** (20); **beam** deflection means (26, 28) adapted to deflect an output beam (24) as a return beam (30) through said crystal (18) at a return angle (A) to the **probe beam** (20) within the crystal (18) which is sufficiently small to induce a **phase conjugate** (32) of said **probe beam** (20); characterized by means (14, 16, 8) for applying an alternating electric field to said...

...said intensity pattern and photorefractive index grating resulting from the interference of said deflected return **beam** (30) and said **probe beam** (20) within said crystal, wherein said shift between said intensity pattern and said photorefractive index...

...photorefractive material having an electro-optic coefficient not high enough to inherently sustain self-pumped **phase conjugation**.

2. The self-pumped PCM of claim 1, said photo refractive material having an electro...

...less than the index grating formation time of the crystal material.

7. A self-pumped **phase conjugate** mirror (PCM), comprising a body (18) formed from a photorefractive material and adapted to receive an optical **probe beam** (20);
external **beam** deflection means (26, 28) adapted to deflect said **probe beam** (20) which has been transmitted through said body (18) at a predetermined return angle to the **probe beam** (20) back through the body (18) to induce a **phase conjugate** (32) of the **probe beam** (20); characterized by further comprising means (8, 14, 16) for applying an alternating electric field...

...photorefractive material has an electro-optic coefficient not high enough to inherently sustain self-pumped **phase conjugation** and in that said **phase conjugate** of the **probe beam** (20) is induced without external pump beams

8. The self-pumped PCM of claim 7...

...the body (18) of less than about 5(degree).

10. A method of forming a **phase conjugate** of a **probe** optical **beam** (20), comprising:
directing the beam through a photorefractive crystal (18) in a first direction;
directing...

...a sufficiently small angle to the first direction within the crystal (18) to induce a **phase conjugate** of said **probe** optical **beam** (20); characterized by the further steps of
applying an alternating electric field across the crystal...

November 5, 2002

...said intensity pattern and photorefractive index grating resulting from the interference of said deflected return **beam** (30) and said **probe beam** (20) within said crystal, wherein said shift between said intensity pattern and said photorefractive index...
...photorefractive material has an electro-optic coefficient not high enough to inherently sustain self-pumped **phase conjugation** .
11. The method of claim 10, the probe optical beam (20) comprising a continuous wave...

12/3,K/18 (Item 18 from file: 348)
DIALOG(R)File 348:EUROPEAN PATENTS
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00273343

An apparatus for optically analyzing an object using four-wave mixing technique.

Gerat zur optischen Analyse eines Gegenstandes unter Verwendung der Vierwellen-Mischungstechnik.

Appareil d'analyse optique d'un objet utilisant la technique de melange de quatre ondes.

PATENT ASSIGNEE:

HAMAMATSU PHOTONICS K.K., (631420), 1126-1 Ichino-cho Hamamatsu-shi, Shizuoka-ken, (JP), (applicant designated states: DE;GB)

INVENTOR:

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Tsuchiya, Yutaka, c/o Hamamatsu Photonics K.K. No. 1126-1 Ichino-cho, Hamamatsu-shi Shizuoka, (JP)

LEGAL REPRESENTATIVE:

Rackham, Stephen Neil et al (35061), GILL JENNINGS & EVERY, Broadgate House, 7 Eldon Street, London EC2M 7LH, (GB)

PATENT (CC, No, Kind, Date): EP 271339 A2 880615 (Basic)
EP 271339 A3 890607
EP 271339 B1 940316

APPLICATION (CC, No, Date): EP 87310862 871210;

PRIORITY (CC, No, Date): JP 86293538 861211; JP 86302912 861219

DESIGNATED STATES: DE; GB

INTERNATIONAL PATENT CLASS: G03H-001/00; G02F-001/35;

ABSTRACT WORD COUNT: 174

LANGUAGE (Publication,Procedural,Application): English; English; English

FULLTEXT AVAILABILITY:

Available Text	Language	Update	Word Count
CLAIMS B	(English)	EPBBF1	522
CLAIMS B	(German)	EPBBF1	484
CLAIMS B	(French)	EPBBF1	537
SPEC B	(English)	EPBBF1	6875
Total word count - document A			0
Total word count - document B			8418
Total word count - documents A + B			8418

...ABSTRACT path to the reference beam I, II. The object beam III interferes with the reference **beam** I, II to **produce a phase conjugate** which is returned along the path of the object beam. A beam splitter (9) directs the **phase conjugate** beam onto an image observation device (10). ...

...CLAIMS a diffusely reflecting object (15) using a four wave mixing technique, the apparatus comprising:
a **laser** source (1) for producing a **pulsed laser beam** ;
a non-linear optical element (12) for **producing a phase conjugate wave** in accordance with a beam incident on it;
a first beam splitting means (2) for...

November 5, 2002

...7) for guiding the object beam (III);
a third guide means (9) for projecting the **phase conjugate**
object **wave from** the non-linear optical element (12) onto image
observing means (10); characterised in that the second **guide means**
(7) include beam expanding means for illuminating the object, and a
focusing lens (11) for...

12/3,K/19 (Item 19 from file: 348)
DIALOG(R)File 348:EUROPEAN PATENTS
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00247380

Phase conjugate reflecting media.
Phasenkonjugierte reflektierende Medien.
Milieux réfléchissants a conjugaison de phase.

PATENT ASSIGNEE:

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PATENT (CC, No, Kind, Date): EP 243130 A1 871028 (Basic)
EP 243130 B1 910612

APPLICATION (CC, No, Date): EP 87303437 870416;

PRIORITY (CC, No, Date): GB 8610027 860424

DESIGNATED STATES: BE; CH; DE; ES; FR; GB; IT; LI; NL; SE

INTERNATIONAL PATENT CLASS: G02F-001/35; G03H-001/04; C08F-138/02

ABSTRACT WORD COUNT: 76

LANGUAGE (Publication,Procedural,Application): English; English; English

FULLTEXT AVAILABILITY:

Available Text	Language	Update	Word Count
CLAIMS B	(English)	EPBBF1	326
CLAIMS B	(German)	EPBBF1	268
CLAIMS B	(French)	EPBBF1	354
SPEC B	(English)	EPBBF1	2472
Total word count - document A			0
Total word count - document B			3420
Total word count - documents A + B			3420

...CLAIMS beams having a wavelength in the infra-red region of the
electromagnetic spectrum.

8. A **phase conjugate** mirror when used in a device according to any
one of the preceding claims 3-7 wherein said device has means for
producing at least two **laser** beams and one other beam which are
incident upon the optical medium, thereby giving rise...

12/3,K/20 (Item 1 from file: 349)
DIALOG(R)File 349:PCT FULLTEXT
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00916836 **Image available**

HIGH POWER LASER SYSTEM WITH FIBER AMPLIFIERS AND LOOP PCM
SYSTEME LASER EXTREMEMENT PUISSANT COMPORTANT DES AMPLIFICATEURS DE FIBRES
ET UN MIROIR A CONJUGAISON DE PHASE EN BOUCLE

November 5, 2002

Patent Applicant/Assignee:

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US)

Patent Applicant/Inventor:

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Legal Representative:

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Patent and Priority Information (Country, Number, Date):

Patent: WO 200250965 A2 20020627 (WO 0250965)
Application: WO 2001US42003 20010904 (PCT/WO US0142003)
Priority Application: US 2000659389 20000911

Parent Application/Grant:

Related by Continuation to: US 2000659389 20000911 (CON)

Designated States: AE AG AL AM AT AU AZ BA BB BG BR BY BZ CA CH CN CO CR CU

CZ DE DK DM DZ EC EE ES FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP
KR KZ LC LK LR LS LT LU LV MA MD MG MK MN MW MX MZ NO NZ PH PL PT RO RU
SD SE SG SI SK SL TJ TM TR TT TZ UA UG US UZ VN YU ZA ZW

(EP) AT BE CH CY DE DK ES FI FR GB GR IE IT LU MC NL PT SE TR

(OA) BF BJ CF CG CI CM GA GN GQ GW ML MR NE SN TD TG

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(EA) AM AZ BY KG KZ MD RU TJ TM

Publication Language: English

Filing Language: English

Fulltext Word Count: 3257

Fulltext Availability:

Claims

Claim

... a first beam multiplexer connected to receive the input laser beam
from said coupler to **produce** a plurality of **beams** ,
a plurality of fiber amplifiers to receive respectively said plurality of
beams and amplify said...

...beams to combine said amplified plurality of beams into a resultant
amplified
beam, and
a **phase conjugate** mirror arrangement, including a further fiber
amplifier, said **phase conjugate** mirror arrangement having an input
receiving said resultant amplified beam, said **phase conjugate** mirror
arrangement providing a loop path for said resultant amplified beam in
which said resultant amplified beam is further amplified and **phase**
conjugated with said resultant amplified beam received at the input of
said **phase conjugate** mirror arrangement thereby eliminating any phase
and polarization distortions and aberrations occurring in said fiber
amplifiers,
said **phase conjugate** mirror arrangement producing an output beam
which is supplied in reverse direction through said second...

...method as claimed in claim 8, wherein said single resultant
amplified beam supplied to said **phase conjugate** mirror arrangement
passes through a non-linear cell to an amplifier which produces an
amplified...

...said amplified output signal from said amplifier back to said non-linear
cell whereat a **phase conjugated beam** is **produced** which passes in
reverse direction in said loop for output therefrom as said output beam
from said **phase conjugate** mirror arrangement.

November 5, 2002

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00914576 ****Image available****

MULTIPLEX COHERENT RAMAN SPECTROSCOPY DETECTOR AND METHOD
DETECTEUR ET PROCEDE DE SPECTROSCOPIE MULTIPLE COHERENTE DE RAMAN

Patent Applicant/Assignee:

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Legal Representative:

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Patent and Priority Information (Country, Number, Date):

Patent: WO 200248660 A1 20020620 (WO 0248660)

Application: WO 2001US45852 20011213 (PCT/WO US0145852)

Priority Application: US 2000254926 20001213

Designated States: AE AG AL AM AT AU AZ BA BB BG BR BY BZ CA CH CN CO CR CU

CZ DE DK DM DZ EC EE ES FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP

KR KZ LC LK LR LS LT LU LV MA MD MG MK MN MW MX NO NZ PL PT RO RU SD SE

SG SI SK SL TJ TM TR TT TZ UA UG US UZ VN YU ZA ZM ZW

(EP) AT BE CH CY DE DK ES FI FR GB GR IE IT LU MC NL PT SE TR

(OA) BF BJ CF CG CI CM GA GN GQ GW ML MR NE SN TD TG

(AP) GH GM KE LS MW MZ SD SL SZ TZ UG ZM ZW

(EA) AM AZ BY KG KZ MD RU TJ TM

Publication Language: English

Filing Language: English

Fulltext Word Count: 16106

Fulltext Availability:

Claims

Claim

... The apparatus defined by Claim 1, further comprising:

a driving device configured and positioned to **produce** a driving beam
directed to said broadband coherent beam generator to cause the
production of the broadband
coherent...

...driving device

comprises a Raman cell filled with a gas and generating a
backward-propagating, **phase - conjugate** beam of Raman radiation
comprising the driving beam in response to receiving the first narrowband
...

12/3,K/22 (Item 3 from file: 349)

DIALOG(R)File 349:PCT FULLTEXT

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00824619 ****Image available****

MICROPHONE ARRAYS FOR HIGH RESOLUTION SOUND FIELD RECORDING
RESEAU DE MICROPHONES POUR ENREGISTREMENT DE CHAMP SONORE A RESOLUTION
ELEVEE

Patent Applicant/Assignee:

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US)

Patent Applicant/Inventor:

November 5, 2002

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Patent and Priority Information (Country, Number, Date):

Patent: WO 200158209 A1 20010809 (WO 0158209)

Application: WO 2001NZ10 20010202 (PCT/WO NZ0100010)

Priority Application: NZ 502603 20000202

Designated States: AE AG AL AM AT AU AZ BA BB BG BR BY BZ CA CH CN CR CU CZ

DE DK DM DZ EE ES FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR KZ

LC LK LR LS LT LU LV MA MD MG MK MN MW MX MZ NO NZ PL PT RO RU SD SE SG

SI SK SL TJ TM TR TT TZ UA UG US UZ VN YU ZA ZW

(EP) AT BE CH CY DE DK ES FI FR GB GR IE IT LU MC NL PT SE TR

(OA) BF BJ CF CG CI CM GA GN GW ML MR NE SN TD TG

(AP) GH GM KE LS MW MZ SD SL SZ TZ UG ZW

(EA) AM AZ BY KG KZ MD RU TJ TM

Publication Language: English

Filing Language: English

Fulltext Word Count: 7864

Fulltext Availability:

Claims

Claim

... line of microphones with either equal or different inter-microphone 1
5 separations, and use **beam** forming principles to **produce** one or more
beams with sharp directivity in one or more directions. Surround sound
systems offer the potential for...6)

2 2

The second term consists of a negative frequency complex plane wave with
conjugate phase and the same positive wavenumber k_0 propagating in the
opposite direction $00 + /r$. The spectrum...

12/3,K/23 (Item 4 from file: 349)

DIALOG(R)File 349:PCT FULLTEXT

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00758994 **Image available**

BI-DIRECTIONAL SHORT PULSE RING LASER

LASER BIDIRECTIONNEL EN ANNEAU A IMPULSION BREVE

Patent Applicant/Assignee:

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Patent and Priority Information (Country, Number, Date):

Patent: WO 200072411 A1 20001130 (WO 0072411)

Application: WO 2000US11516 20000428 (PCT/WO US0011516)

Priority Application: US 99131843 19990430

Designated States: AE AG AL AM AT AU AZ BA BB BG BR BY CA CH CN CR CU CZ DE

DK DM EE ES FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR KZ LC LK

November 5, 2002

LR LS LT LU LV MA MD MG MK MN MW MX NO NZ PL PT RO RU SD SE SG SI SK SL
TJ TM TR TT TZ UA UG US UZ VN YU ZA ZW
(EP) AT BE CH CY DE DK ES FI FR GB GR IE IT LU MC NL PT SE
(OA) BF BJ CF CG CI CM GA GN GW ML MR NE SN TD TG
(AP) GH GM KE LS MW SD SL SZ TZ UG ZW
(EA) AM AZ BY KG KZ MD RU TJ TM

Publication Language: English

Filing Language: English

Fulltext Word Count: 13091

English Abstract

...laser produces bi-directional light pulses that interact in such a way that they are **phase conjugated**. A nonlinear substance, such as a nonlinear crystal (4) or fluid (CS/2), that has...

...refraction that is dependent upon light intensity is located near a beam waist of the **laser** cavity to **produce** a self-lensing effect. Methods for reducing dead band beyond observable limits are also provided...

12/3,K/24 (Item 5 from file: 349)

DIALOG(R)File 349:PCT FULLTEXT

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00188688

METHOD AND APPARATUS FOR ENERGY TRANSFERS BETWEEN OPTICAL BEAMS USING
NEAR-BANDGAP ELECTROREFRACTIVE EFFECT

PROCEDE ET APPAREIL DE TRANSFERTS D'ENERGIE ENTRE DES FAISCEAUX OPTIQUES
UTILISANT L'EFFET ELECTROREFRACTIF D'INTERBANDE

Patent Applicant/Assignee:

HUGHES AIRCRAFT COMPANY,

Inventor(s):

VALLEY George C,

KLEIN Marvin B,

PARTOVI Afshin,

KOST Alan,

GARMIRE Elsa M,

Patent and Priority Information (Country, Number, Date):

Patent: WO 9106032 A1 19910502

Application: WO 90US5593 19901001 (PCT/WO US9005593)

Priority Application: US 89480 19891013

Designated States: AT BE CH DE DK ES FR GB IT JP LU NL SE

Publication Language: English

Fulltext Word Count: 5586

Fulltext Availability:

Claims

Claim

... between the beams,

22 The system of claim 21, said PR material comprising a **phase conjugating** medium, wherein said **beams** are arranged to **produce** a **phase conjugate** of one of the beams from said medium.

23 The system of claim 22, implemented...

12/3,K/25 (Item 6 from file: 349)

DIALOG(R)File 349:PCT FULLTEXT

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00183853

COUPLING MECHANISM FOR EFFICIENT CONVERSION OF AXISYMMETRIC BEAM PROFILES
INTO PROFILES SUITABLE FOR DIFFRACTION-FREE TRANSMISSION IN FREE SPACE

November 5, 2002

MECANISME DE COUPLAGE POUR LA CONVERSION EFFICACE DE PROFILS DE RAYONS
AXISYMETRIQUES EN PROFILS APPROPRIES POUR UNE TRANSMISSION SANS
DIFFRACTION DANS UN ESPACE LIBRE

Patent Applicant/Assignee:

STEWART Bob W,

Inventor(s):

STEWART Bob W,

Patent and Priority Information (Country, Number, Date):

Patent: WO 9101193 A2 19910207

Application: WO 90US4009 19900717 (PCT/WO US9004009)

Priority Application: US 89890 19890718

Designated States: AT AT AU BB BE BF BG BJ BR CA CF CG CH CH CM DE DE DK DK

ES ES FI FR GA GB GB HU IT JP KP KR LK LU LU MC MG ML MR MW NL NL NO RO

SD SE SE SN SU TD TG

Publication Language: English

Fulltext Word Count: 3046

Fulltext Availability:

Claims

Claim

... third optical path;
optics disposed along said third optical
path for collimating said amplified pc beam , produc
ing the J @profiled beam;
phase conjugation means disposed at ter
mination of the first and second optical paths and at
the...

...profiled light;
optics disposed along said second optical
path for the purpose of forming a probe beam and
backward pump beam from the higher intensity segment
and to focus said beams into...

...third optical path;
optics disposed along said third optical
path for collimating said amplified pc beam , produc
ing the JO@profiled beam;
phase conjugation means disposed at ter
mination of the first and second optical paths and at
the beginning of the third optical path for encoding
the probe beam with the transverse intensity profile
of the forward pump beam,
o Apparatus comprising:
oscillator means...along the first optical path for
receiving the encoded coherent light, substantially
amplifying it, and phase conjugating it;
optics disposed along the first optical path
in order to redirect the pc beam...

...profiled light;
optics disposed along said second optical
path for the purpose of forming a probe beam and
forward pump beam from the higher intensity segment
and to focus said beams into...third optical path;
optics disposed along said third optical
path for collimating said amplified pc beam , produc
ing the Jo-profiled beam;
phase conjugation means disposed at ter
mination of the first and second optical paths and at
the beginning of the third optical path for encoding
the probe beam with the transverse intensity profile
of the backward pump beam. -1 g
6e Apparatus comprising...

November 5, 2002

12/3,K/26 (Item 7 from file: 349)
DIALOG(R)File 349:PCT FULLTEXT
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00177423

**BANDWIDTH-PRESERVING BRILLOUIN PHASE CONJUGATE MIRROR AND METHOD
PROCEDE ET MIROIR A PHASES CONJUGUEES DE BRILLOUIN A CONSERVATION DE LA
BANDE PASSANTE**

Patent Applicant/Assignee:

HUGHES AIRCRAFT COMPANY,

Inventor(s):

ROCKWELL David A,

LIND Richard C,

PEPPER David M,

Patent and Priority Information (Country, Number, Date):

Patent: WO 9010889 A1 19900920

Application: WO 90US914 19900222 (PCT/WO US9000914)

Priority Application: US 89649 19890315

Designated States: AT BE CH DE DK ES FR GB IT JP LU NL SE

Publication Language: English

Fulltext Word Count: 6574

English Abstract

...laser (82) is fed into a Brillouin-enhanced four wave mixer (88) which generates a **phase conjugated** seed beam in counterpropagation with the input beam. A Brillouin amplifier (86) is provided between...

...from the input beam (Ep) to the seed beam (Ec) and thereby amplify the seed **beam** to **produce** a **phase conjugated** output beam with approximately 50 % of the energy of the input beam and narrow bandwidth ...

...associated with the acoustic noise generally required to initiate and sustain stimulated Brillouin scattering. The **phase conjugated** output beam can be modulated or steered in direction, as desired. Reference beams for the...

12/3,K/27 (Item 8 from file: 349)
DIALOG(R)File 349:PCT FULLTEXT
(c) 2002 WIPO/Univentio. All rts. reserv.

00176793

**REAL-TIME DYNAMIC HOLOGRAPHIC IMAGE STORAGE DEVICE
DISPOSITIF DE STOCKAGE DYNAMIQUE EN TEMPS REEL D'IMAGES HOLOGRAPHIQUES**

Patent Applicant/Assignee:

THE UNITED STATES GOVERNMENT as represented by THE NATIONAL AERONAUTICS
AND SPACE ADMINISTRATION,

Inventor(s):

LAFLEUR Sharon S,

MONTGOMERY Raymond C,

Patent and Priority Information (Country, Number, Date):

Patent: WO 9010258 A1 19900907

Application: WO 90US971 19900302 (PCT/WO US9000971)

Priority Application: US 89217 19890302

Designated States: AT AU BE CA CH DE DK ES FR GB IT JP KR LU NL SE

Publication Language: English

Fulltext Word Count: 4282

Fulltext Availability:

Claims

Claim

November 5, 2002

... a first dynamic interference pattern
between the object beam and the first set of reference
beams to produce a phase - conjugate object beam;
(c) creating a dynamic interference pattern between
io the phase - conjugate object beam and the second set of
reference beams to produce a reconstructed object beam ;
and
(d) directing the reconstructed object beam into the
first dynamic interference pattern to enable...

...reference beams and the object
2o beam initially, the reconstructed object beam
subsequently, and the phase - conjugate object beam,
respectively.
3* A method as recited in claim 2. wherein the at
least...

...e) comprises adjusting an angular
relationship between at least one of the reconstructed
5 and phase - conjugate object beams and the first and second
sets of reference beams, respectively.
8e A method...

...recited in step 11 further
comprising the step of processing at least one of the
phase - conjugate object beam and the reconstructed object
beam.

9 An apparatus for storing a holographic image...

...a first dynamic
interference pattern between the object beam and the
first set of reference beams to produce a phase - conjugate
object beam;
second pattern means for creating a second dynamic
20 interference pattern between the phase - conjugate object
beam and the second set of reference beams to produce a
reconstructed object beam ; and
directing means for directing the reconstructed
object beam into the first dynamic interference pattern...

12/3,K/28 (Item 9 from file: 349)

DIALOG(R)File 349:PCT FULLTEXT

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00157640

OPTICAL DEVICE USING STIMULATED BRILLOUIN SCATTERING
DISPOSITIF OPTIQUE UTILISANT LA DIFFUSION BRILLOUIN STIMULEE

Patent Applicant/Assignee:

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Patent and Priority Information (Country, Number, Date):

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Priority Application: US 87941 19871021

Designated States: BE CH DE FR GB IT JP KR NL NO SE

Publication Language: English

Fulltext Word Count: 5912

Fulltext Availability:

Claims

November 5, 2002

Claim

... a
phase conjugate mirror (PCM) which operates upon an input
optical beam to produce a phase conjugate output beam, the
fidelity of the output beam to the input beam decreasing
with increasing...

...a gain medium whose stimulated
Brillouin scattering (SBS) gain coefficient is sufficient
ly low to produce an output beam whose fidelity to the
input beam is at least equal to a desired amount...

12/3,K/29 (Item 10 from file: 349)
DIALOG(R)File 349:PCT FULLTEXT
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00140846

SYSTEM AND METHOD FOR ENCODING INFORMATION ONTO AN OPTICAL BEAM
SYSTEME ET PROCEDE SERVANT A CODER DES INFORMATIONS SUR UN FAISCEAU OPTIQUE

Patent Applicant/Assignee:

HUGHES AIRCRAFT COMPANY,

Inventor(s):

PEPPER David M,

Patent and Priority Information (Country, Number, Date):

Patent: WO 8705715 A1 19870924

Application: WO 87US292 19870212 (PCT/WO US8700292)

Priority Application: US 86344 19860321

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Publication Language: English

Fulltext Word Count: 6301

Fulltext Availability:

Claims

Claim

... alternating
field frequency for the first PCM, and means for sensing
frequency differences between the phase conjugated output
beams of the two PCMs to detect the modulation applied to
alternating field for...

...medium between the mirror and PCM,, the mirror,, PCM and
- 21

gain medium comprising a phase conjugate laser, wherein
the modulating means is adapted to modulate the electric
field within the PCM...the transfer of energy from the first to the
second beam,

22* A self-pumped phase conjugate mirror (PCM),
comprising:

a crystal formed from a photorefractive material
adapted to receive a first...

...a return angle to the first beam path within the
body at which a phase conjugated output beam is produced ,
and
means for modulating the alternating electric
field to encode information onto the output beam...

...at least one second optical beam to the
body to cross-couple with the first beam and produce a
...returning the first beam through the body at a return
angle to the first beam to produce an output beam as a
phase conjugate of the first beam, thereby providing

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self-pumped conjugate reflection of the first beam. - 24...

12/3,K/30 (Item 11 from file: 349)
DIALOG(R)File 349:PCT FULLTEXT
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00140537

SELF-PUMPED PHASE CONJUGATE MIRROR
MIROIR A CONJUGAISON DE PHASE A AUTO-POMPAGE

Patent Applicant/Assignee:

HUGHES AIRCRAFT COMPANY,

Inventor(s):

VALLEY George C,

KLEIN Marvin B,

Patent and Priority Information (Country, Number, Date):

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Priority Application: US 86679 19860305

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Publication Language: English

Fulltext Word Count: 3858

Fulltext Availability:

Claims

English Abstract

A self-pumped **phase conjugate** mirror and method in which an optical beam (20) is applied to a crystal (18...

...back into the crystal as a return beam (30) to cross-couple with the input **probe beam** (20) and an alternating electric field is applied across the crystal to establish a photorefractive...

...shift of about 90degrees and bring the crystal gain up to a level at which **phase conjugation** takes place. By a suitable selection of field strength and frequency, and an angle between the **probe** and return **beams** within the crystal of less than about 5degrees (3degrees for GaAs), semiconductor materials with electro...

Claim

1a A self-pumped **phase conjugate** mirror (PCM), comprising:
a crystal formed from a photorefractive material and adapted to receive an optical **probe beam**, means for applying an alternating electric field to the crystal of sufficient magnitude and frequency...

...shift of about 90° within the crystal, and beam deflection means adapted to deflect a **probe beam** back through the crystal at a return angle to the **probe beam** within the crystal which is sufficiently small to induce a **phase conjugate** of the **probe beam**. 2a. The self-pumped PCM of claim 1, said photorefractive material having an electro...

...deflection means deflecting the -return beam back through the crystal at an angle to the **probe beam** within the crystal of less than about 50°, So The self-pumped PCM of claim...

...but less than the grating formation time of the crystal material.

7e A self-pumped **phase conjugate** mirror (PCM), comprising:

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a body formed from a photorefractive material
and adapted to receive an optical **probe beam** ,
means for establishing a photorefractive index
grating shift of about 901 within the body, and...

...which has been transmitted through the PCM body at a
predetermined return angle to the **probe beam** back through
the body to induce a **phase conjugate** of the **probe beam** . So The
@self-opumped PCM of claim 7, said photorefractive material comprising a
semiconductor.
9...

...for directing the return
beam back through the photorefractive material at an angle
to the **probe beam** within the body of less than about 5'.

10 A method of forming a **phase conjugate** of a **probe**
optical **beam** , comprisirig:
directing the beam through a photorefractive
crystal in a first direction,
establishing a photorefractive...

...at a sufficiently small angle to
the first direction within the crystal to induce a **phase**
conjugate of the input beam.
11o, The method of claim 10, the **probe** optical **beam**
. I
comprising a continuous wave laser beam.
12* The method of claim 10, said photorefractive...

12/3,K/31 (Item 12 from file: 349)
DIALOG(R)File 349:PCT FULLTEXT
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00137645

ASSOCIATIVE HOLOGRAPHIC MEMORY APPARATUS EMPLOYING PHASE CONJUGATE MIRRORS
DISPOSITIF DE MEMOIRE A HOLOGRAPHIE ASSOCIATIVE UTILISANT DES MIROIRS A
CONJUGAISON DE PHASES

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LIND Richard C,

Patent and Priority Information (Country, Number, Date):

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Publication Language: English

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Fulltext Availability:

Claims

Claim

... stored-image-associated reference
beam and where the hologram has the properties of
providing a **probe** -reference **beam** in response to a
probe image being incident thereon and, in a
reciprocal manner, prdviding the probe image in

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response to the **probe** -reference **beam** being incident thereon;
a first **phase conjugate** mirror;
first light path means for conveying the **probe** reference **beam** provided by the hologram to the first **phase conjugate** mirror and for conveying back to the hologram a **phase conjugated probe** reference **beam** generated by the first **phase conjugate** mirror;
a second **phase conjugate** mirror;
second light path means for conveying the probe image provided by the hologram to the second **phase conjugate** mirror and for conveying back to the hologram a **phase conjugated probe** image generated by the second **phase conjugate** mirror;
third light path means for conveying the input image to the hologram as a probe image; and
fourth light path means for conveying the **phase conjugated** probe image generated by the second **phase conjugate** mirror to an output image viewing plane.

2 The apparatus of Claim 1 in which the first **phase conjugate** mirror further includes threshold means for conveying back to the hologram a **phase conjugate** of only those components of the **probe** reference **beam** which exceed a predetermined threshold level of beam intensity.

3e The apparatus of Claim 2 in which the first light path means includes means for focusing the **probe** reference **beam** provided by the hologram onto the first **phase conjugate** mirror.

4 The apparatus of Claim 2 in which the first **phase conjugate** mirror is a **phase conjugate** mirror with amplification which provides a **phase conjugate probe** reference **beam** having a greater amplitude than the corresponding **probe** reference **beam**.

5 The apparatus of Claim 4 in which the amount of amplification is sufficient to...stored-image-associated reference

beam and where the hologram has the properties of providing a **probe** reference **beam** in response to a probe image being incident thereon and, in a 10- reciprocal manner, of providing the probe image in response to the **probe** reference **beam** being incident thereon;

a **phase conjugate** mirror;
first light path means for conveying the **probe** reference **beam** provided by the hologram to the **phase conjugate** mirror and for conveying back to the hologram a **phase conjugated probe** reference **beam** generated by the **phase conjugate** mirror;
second light path means for conveying the probe image provided by the hologram to the **phase conjugate** mirror and for conveying back to the hologram a **phase conjugated** probe image generated by the **phase conjugate** mirror;
third light path means for conveying the input image to the hologram as a probe image; and
fourth light path means for conveying the **phase conjugated** probe image generated by the **phase conjugate** mirror to an output image viewing plane.

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10 The apparatus of Claim 9 in which the **phase conjugate** mirror further includes threshold means for conveying back to the hologram a **phase conjugate** of only those components of the **probe reference beam** which exceed a predetermined threshold level of beam intensity.

The apparatus of Claim 10 in which the first light path means includes means for focusing the **probe reference beam** provided by the hologram onto the **phase conjugate** mirror.

12 The apparatus of Claim 10 in which the **phase conjugate** mirror is a **phase conjugate** mirror with amplification which provides a **phase conjugated probe reference beam** having a greater amplitude than the corresponding **probe reference beam**.

13 The apparatus of Claim 12 in which the amount of amplification 'is sufficient to...

12/3,K/32 (Item 13 from file: 349)
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00120115

DEGENERATE FOUR-WAVE MIXER USING MULTIPLE QUANTUM WELL STRUCTURES
MELANGEUR DEGENERERE DE QUATRE ONDES UTILISANT DES STRUCTURES DE Puits DE
QUANTA MULTIPLES

Patent Applicant/Assignee:

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SMITH Peter William,

Patent and Priority Information (Country, Number, Date):

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Priority Application: US 83319 19830228

Designated States: DE FR GB JP NL

Publication Language: English

Fulltext Word Count: 15075

Fulltext Availability:

Claims

English Abstract

...substantially overlaps said first beam of light within said MQW structure. At least one output **phase conjugate beam** of light is **produced** by interaction of said first and said second beams of light with said multiple quantum well structure. An alternate embodiment has two counterpropagating pump **beams** and a **probe beam** of light which **produce** a backward scattered **phase conjugate** beam of light.

Claim

... and the multiple layer
heterostructure being on a single substrate,

30 Method of generating a **phase conjugate** light beam,

CHARACTERIZED BY

a) providing ...pump beam of light so that
it propagates through the MQW structure;

c) directing a **probe beam** of light so that it

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0

- 45

propagates through the MQW and substantially overlaps...

...light within the MQW structure so that a first output beam of light which is **phase conjugate** to the **probe beam** of light is generated within the MQW and propagates away from the MQW.

31 Method...

...pump beam of light and substantially overlaps the first pump beam of light and the **probe beam** of light within the MQW structure so that the first pump beam, the second pump **beam** and the **probe beam** interact with the MQW structure and produce at least one second output beam of light which is **phase conjugate** to the **probe beam** of light and which propagates away from the MQW
Wipo
I @ T. A four-wave...

...first beam of light (550) within the MQW structure so that at least one output **phase conjugate** beam of light (560) is produced by interaction of the first (550) and the second...material has a minimum bandgap value of 0.73eV.
4 8. Method of generating a **phase conjugate** light beam, comprising
a) providing a multiple quantum well (MQW) structure as a nonlinear optical...

...beam of light so that it propagates through the MQW Structure and
c) directing a **probe beam** of light so that it propagates through the MQW
CHARACTERIZED BY
the **probe beam** of light is directed to substantially overlap the first pump beam of light within the...

...of light is generated within the MQW and propagates away from the MQW which is **phase conjugate** to the **probe beam** of light.

33 Method according to claim 30,
CHARACTERIZED BY
directing a second pump beam...

...pump beam of light and substantially overlaps the first pump beam of light and the **probe beam** of light within the MQW structure, so that the first pump beam, the second pump **beam** and the **probe beam** interact with the MQW structure and produce at least one second output beam of light which is **phase conjugate** to the **probe beam** of light and which propagates away from the MQW
rX
NA